# COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper

Second-class postage paid at Boston, Mass., and additional mailing offices

year August 29, 1973 Vol. VII, No. 35

## UNiversal DP

These eighth graders – each from a different continent – are getting together to solve complex math problems at the new United Nations International School. The Edusystem-25 minicomputer system was a gift from Digital Equipment Corp. and will be shared by students from more than 90 countries attending the school.

## Will IBM Announce True Mini This Year?

**By E. Drake Lundell Jr.**
CW Washington Bureau

WASHINGTON, D.C. – IBM is poised to introduce a true minicomputer sometime this year, if plans made in 1971 are still holding firm.

And even if the planned system's introduction is delayed until early or mid-1974, users can expect it to replace the System/3 line in some respects.

In a recently uncovered report from the IBM Management Committee to the Management Review Committee, the group admitted the firm had a "serious problem" in the area of basic minicomputer systems.

### 'Want One, Too'

"The key difficulty is the absence of a general-purpose system at a rental of less than $1,000/mo. Competition both here and abroad have such systems," the IBM planners said.

At that time, the firm was basically considering three minicomputers to fill the gap in its line – one would have been a derivative of the S/3, another would have been "a small batch system based on the unit record approach" and the final would have been an entirely new unit.

The first two were rejected "due to unacceptable profit" by the company's top management even though pushed by the General Systems Division.

Therefore, the group decided on the third approach, a new system which would be ready hopefully for announcement in the third quarter of this year and sell for just under $1,000/mo.

"The system is a major step

(Continued on Page 2)

Special
★Report★
More Storage
For Your Buck
Page 17

*Line Discipline*

## IBM's SDLC Can Support Full Duplex

**By Ronald A. Frank**
Of the CW Staff

WHITE PLAINS, N.Y. – IBM has introduced a new data communications line discipline that will benefit users with terminal equipment operating at 2K bit/sec or higher.

Called Synchronous Data Link Control (SDLC), the transmission format will be restricted to operating with virtual mainframes and will not be compatible with IBM's present standard Binary Synchronous Communications (BSC).

From a technical standpoint, the SDLC discipline does not have to be restricted to operating only with virtual storage computer systems. But the company has said "IBM supports SDLC with virtual programming which is a characteristic of System/370."

### Full Duplex Supported

The SDLC methodology marks IBM's first support of full-duplex terminal transmission techniques and will allow users to transmit messages simultaneously in both directions over 4-wire private-line networks.

By effectively increasing the transmission capacity of existing private-line nets (which are now restricted to half-duplex with BSC) the SDLC discipline will benefit users transmitting large volumes of data. In addition.

(Continued on Page 4)

*Editorial*

## The User's Choice

The user community has but a few days to decide whether it wants representation in the American Federation of Information Processing Societies (Afips).

Aug. 31 is the deadline set by the Data Processing Management Association for its seven-member study committee to gather opinion on whether DPMA should accept an invitation to join Afips.

Whatever the outcome, careful deliberation should precede the final decision.

This would be a big move for users, since DPMA would become the second largest member of the federation, with a membership of around 25,000 (only the Association for Computing Machinery is larger).

But acceptance of the Afips invitation would do more than add this "status." It would formalize the user community as an entity, and it would provide Afips with

(Continued on Page 4)

## Medicare Contracts To Perot Firm Probed

**By E. Drake Lundell Jr.**
CW Washington Bureau

WASHINGTON, D.C. Prodded by congressional critics, the General Accounting Office is taking a close look at several of the operations of H. Ross Perot's Electronic Data Systems – and so far it doesn't like what it sees.

For example, the GAO recently reported that Perot's firm was awarded the medicare processing contract for the states of West Virginia and Ohio, despite the fact that it submitted the highest bids in those states.

The GAO, often called the congressional "watchdog" agency, is reportedly looking into the circumstances that led to the award to Perot's firm of a contract for medicare processing in New York State that is allegedly valued at around $30 million.

### Cost to Taxpayers

In the two states where the audit has been completed, the GAO report found that the award of the contracts to Perot's firm as opposed to the low bidder will cost the taxpayers almost $1 million a year more.

The contract for Ohio and West Virginia was awarded by Nationwide Mutual Life Insurance Co., which was chosen by the Social Security Administration to handle the medicare claims in those two states.

When the bids were submitted, the one from Perot's Electronic

(Continued on Page 2)

*Student Gets Name, Has Fun*

## Teenager Takes Tymshare Time

**By Patrick Ward**
Of the CW Staff

CUPERTINO, Calif. A teenager with a fondness for computer fun and games, plus a clerical error, cost Tymshare Corp. $1,850 in computer time and a lot of embarrassment recently.

The firm had reportedly given a high school student a demonstration user name about three-and-a-half years ago when he was taking part in a Tymshare program for gifted students in the Palo Alto school district.

However, since then the young man has had a terminal installed in his home. The Palo Alto school district has its own computer, and encourages many of the students to use the computer without charge whenever they get the chance. Some families have installed terminals in their homes to help their children take advantage of this.

From his home, and over a two-week period recently, the youth used a Tymshare computer "about three hours per day and about eight hours per day on weekends," according to a report in a local newspaper.

At Tymshare's $30/hr rate, that amounted to about $1,850 in computer time.

The youth spent the time "playing tic-tac-toe, learning how to program, playing chess, stuff like that," a Tymshare spokesman said.

### Name From the Past

"We thought we had removed that name," the Tymshare man explained. "As it turned out, we hadn't and the name turned up on the user file among the users of the computer."

An operator first noticed the name and questioned it. A trace on the call was ordered.

But "the phone company will trace any number for you, but won't give it to you until you get a police complaint," the Tymshare spokesman went on.

So Tymshare went to police headquarters to file the necessary complaint.

"We had to demonstrate there was some loss to the police in order to get the complaint to get the

(Continued on Page 2)

### On the Inside

**Mass. to Get U.S. Funds Despite Drug Plan Protest** –*Page 4*

**Seventeen Packages Make Software Honor Roll** –*Page 11*

**Japan Technology To Rival U.S.** –*Page 27*

Communications . . . . 13
Computer Industry . . . . 27
Editorial . . . . . . . . . . . . . 8
Financial . . . . . . . . . . . 38
Societies . . . . . . . . . . . . 25
Software/Services . . . . . 11
Systems/Peripherals . . . 15

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY
TM Reg. U.S. Pat. Off.

DR. H.R.J. GROSCH, *editorial director*

EDWARD J. BRIDE, *editor*

V.J. FARMER, *managing editor.* RONALD A. FRANK, *technical news editor.* E. DRAKE LUNDELL JR., *computer industry editor.* MARVIN ARONSON, *assistant managing editor.* DONALD LEAVITT, *software editor.* MICHAEL WEINSTEIN, *systems editor.* MARY UPTON, *financial editor* and *assistant computer industry editor.* LESLIE FLANAGAN, JUDITH KRAMER, *copy editors.* PATRICK G. WARD, TONI WISEMAN, MARGUERITE Y. ZIENTARA, *staff writers.*

ALAN TAYLOR, J. DANIEL COUGER, FRANK GREENWOOD, *columnists.*

E. DRAKE LUNDELL JR., *Washington bureau.* MARVIN SMALHEISER, *West Coast bureau.* J.H. BONNETT, *European bureau.* HIDETSUNA SASAKI, *Asian bureau.*

NEAL WILDER, *vice president – marketing.* DOROTHY TRAVIS, *marketing administrator.* JUDY MILFORD, *advertising coordinator.* KATHRYN V. DINNEEN, *market research.*

LEETE DOTY, *production manager.* HENRY FLING, *production supervisor.*

W. WALTER BOYD, *publication manager.* PATRICK J. McGOVERN, *publisher.*

EDITORIAL OFFICES: 797 Washington St., Newton, Mass. 02160. Phone: (617) 332-5606. Telex: 92-2529. **Washington:** Room 1129, National Press Bldg., Washington, D.C. 20004. Phone: (202) 638-0901. Telex: 89-544. **Los Angeles:** 963 N. Edgecliffe Drive, Los Angeles, Calif. 90026. Phone: (213) 665-6008. **Europa:** Computerworld, c/o IDC Europa Ltd., 59 Grays Inn Rd., London, W.C.1, England. Phone: 01-242-8908. **Asia:** Computerworld, c/o Shukan Computer, Dempa Building, 1-11-15, Higashi Gotanda, Shinagawa-ku, Tokyo 141. Phone: (03) 445-6101. Telex: 26792.

Second-class postage paid at Boston, Mass., and additional mailing offices. Published weekly (except: a single combined issue for the last week in December and the first week in January) by Computerworld, Inc., 797 Washington St., Newton, Mass. 02160. © 1973 by Computerworld, Inc.

Reproduction of material appearing in *Computerworld* is strictly forbidden without written permission. Send all requests to publication manager.

*Computerworld* can be purchased on 35mm microfilm in half-volumes (six-month periods) through University Microfilm, Periodical Entry Dept., 300 Zeeb Rd., Ann Arbor, Mich. 48106. Phone: (313) 761-4700.

25 cents a copy; $9 a year in the U.S.; $10 a year in Canada; all other foreign, $25 a year. MARGARET PHELAN, *circulation manager.* Four weeks' notice required for change of address. Address all subscription correspondence to circulation manager, Computerworld, 797 Washington St., Newton, Mass. 02160. v

COMPUTERWORLD, INC.

Patrick J. McGovern.............................. *president*
W. Walter Boyd................*executive vice president*
Robert M. Patterson............. *vice president–int'l.*
T. Neal Wilder.............. *vice president–marketing*

BPA ABP AIA

POSTMASTER: Send Form 3579 (Change of Address) to Computerworld Circulation Dept., 797 Washington St., Newton, Mass. 02160.

# Government Probing Operations of EDS

*(Continued from Page 1)*

Data Systems Federal Corp. (EDSF) was $6.2 million a year, McDonnell Douglas Automation Co. bid $5.9 million and University Computing Co. came in with the low bid of $5.3 million.

In addition, the GAO also charged Nationwide had changed the specifications on the contract to favor the Perot firm after the bidding had started.

"Notwithstanding Nationwide's adjustments, its cost evaluation concluded that UCC's proposal produced the lowest cost, McDonnell Douglas produced the next lowest and EDSF's produced the highest," the GAO report said.

However, Nationwide awarded the contract to Perot's firm "because of its past performance record and other factors," according to the report.

### New York Investigation

Perot's main firm, Electronic Data Systems, is also under attack by Rep. Benjamin Rosenthal (D-N.Y.), who has claimed that the firm used "questionable marketing tactics" in order to get a contract with New York State.

The award in question is only for $125,000 for a computer consulting contract, but Rosenthal said it could be a forerunner of over $30 million in medicaid and welfare computer work in the state.

The contract was reportedly made after Perot, a heavy contributor to Republican causes, made a visit to Gov. Nelson Rockefeller, even though federal officials had opposed awarding the contract to the Perot firm.

In a letter to the governor, Rosenthal said the GAO would make a study of the award, along with the Federal Trade Commission and the Antitrust Division of the Justice Department. Rosenthal has also asked for an investigation by the House Intergovernmental Relations Subcommittee, which commissioned the GAO report on the West Virginia and Ohio contract.

Rosenthal charged that the circumstances surrounding the award of the New York pact "follow an all-too-familiar pattern established elsewhere by EDS: the circumvention of normal and orderly procurement processes and the avoidance of open competition by the utilization of questionable marketing tactics."

Perot's firm has prospered through medicare and medicaid contracts, with its first major pact coming shortly after it was founded in 1968 from Blue Cross of Texas for handling medicare in that state.

That contract, and several others held by EDS, came under strong attack in 1971 before the House Intergovernmental Relations Subcommittee headed by L.H. Fountain (D-N.C.).

In those hearings, one Social Security computer expert estimated the profits for computer work on medicare contracts were running around 100%, and said the profit on the contract that EDS had with Texas Blue Cross produced a profit of 200%.

# Your Mission, Geof, Crack That Security

PALO ALTO, Calif. – Though Tymshare had its troubles with one youth's enthusiasm for computers, the firm has hired another 15-year-old high school student for the summer and told him to try and crack its security software.

Geof Mulligan, who claims an IQ of more than 150, said he is a "hired computer burglar" whose mission is to get by security defenses and tap confidential data from Tymshare's computer system.

Geof, who took a Fortran course at Stanford and knows Basic and Cobol as well, spends as many as 14 hours daily at a terminal in the bedroom of his home. Tymshare provided him with the terminal at no charge. Geof receives no pay from Tymshare but works for "the fun of it" and what he learns.

Geof has access to four Tymshare computers through his terminal. After reaching one of them, he gives his code name and starts experimenting.

"Mainly I just try to think of things that Tymshare may not have thought of, and of places that they haven't blocked yet," said the student who wants to be a systems programmer.

So far Geof hasn't managed to crack the computer's security, but he's working at it.

Tymshare "really set it up beautifully," Geof remarked. Although he remains a frustrated computer burglar, so far he said he has learned a lot from his efforts.

# There's a Mini in IBM's Future

*(Continued from Page 1)*

forward," the group said, "but carries higher than normal risk. While it is the S/3 replacement family, it will be based on new architecture and requires improved D(data) P(rocessing) I/O."

The management committee decided the real risk would be timing of its introduction, but it added the "technology gating factor" would be the development of the "Gulliver file," apparently a new large disk file for smaller systems.

Top management decided to go ahead with the project, although both the marketing department of the firm and World Trade disagreed with the decision in favor of a smaller S/3 in the short term and the introduction of the new family in 1976.

"There is no doubt that the lack of a low-end system will impact our new account potential and make our unit record inventory, particularly abroad, very vulnerable," the management committee noted, indicating that "World Trade believes it will lose one-fourth of its unit record installations to competition by 1976.

"Nonetheless," the management committee reaffirmed its commitment to the new system noting, "We recognize the adverse consequences on the low end of the line, but feel there is no evidence that we can produce a low-cost system with reasonable profit" prior to its development. "All of the evidence is on the other side," it said.

# Tymshare Taken

*(Continued from Page 1)*

phone number."

To do this, the firm told police the mystery user might have access to confidential data, the spokesman said.

A newspaper picked that information up from the police blotter and ran a story headlined, "Thief Steals Data from Computer."

Actually, the teenager could only extract from the computer what he had put in himself, the Tymshare spokesman emphasized.

Tymshare got the number from the phone company and found the youth.

The firm has not filed charges against him claiming this "comedy of mistakes" was entirely its own fault.

# CW on Microfilm

NEWTON, Mass. – *Computerworld* is now available on microfilm to facilitate storage.

Six reels of 35mm microfilm have been issued to date. With the exception of Reel 1 which covers the 18-month period of June 1967 to December 1968, each reel includes a six-month period of publication. Reels 2 through 7 cover January 1969 to December 1971.

### A Full Set

All of 1972 and the first half of 1973 will be available on microfilm in the late fall. There is currently no index, however, for any of the six-month volumes.

Cost for each reel is $8.30. A complete set of all seven reels is available at a 10% discount, or $52.30.

The CW microfilms may be ordered from Periodical Entry Department, University Microfilms, 300 Zeeb Road, Ann Arbor, Mich. 48106.

ATTACH LABEL HERE for address change or inquiry. The code line on top may not mean much to you, but it is the only way we have of quickly identifying your records. If you are receiving duplicate copies, please send both labels. Please let us know four weeks before you plan to move. List new address below and include a current mailing label or your old address.

CHECK HERE TO ENTER YOUR SUBSCRIPTION

☐ 1 year – $9*

*$10 a year in Canada; all other Foreign, $25 a year.

☐ Charge My American Express Account:

If charge we must have cardholder's signature:

☐ New subscription
☐ Change of address

First Initial | Middle Initial | Surname
Your Title
August 29, 1973
Company Name
Send to: Address
City | State | Zip Code

Address shown is. ☐ Business ☐ Home ☐ Check here if you do not want to receive promotional mail from *Computerworld.*

COMPUTERWORLD Circulation Department
797 Washington St., Newton, Mass. 02160

PLEASE CIRCLE 1 NUMBER IN EACH CATEGORY

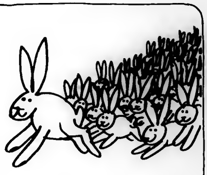
YOUR INDUSTRY
01 Mining/Construction/Oil & Refin.
02 Manufacturing – Computer or data system hardware/peripherals/other associated mechanical devices
03 Manufacturing (other)
04 Utilities/Comm Sys/Transport
05 Wholesale/Retail
06 Finance/Insurance/Real Estate
07 DP Serv. Bureaus/Software/Plann.
08 Business Services (except DP)
09 Education/Medical/Legal
10 Federal, State and Local Govt.
12 Communications/Printing/Publ.
13 Other:

YOUR FUNCTION
01 Corporate Officer
02 Data Processing & other Operational Mgmt
03 Data Processing Professional Staff
04 Consultant
05 Lawyer/Accountant
06 Engineering-Management/Scientific/R&D
07 Sales/Marketing/Account Exec.
08 Librarian/Educator/Student
09 Other:

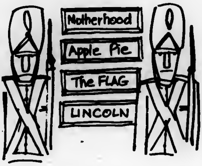
# Did You Know?

One of a series MAKING IBM INSTALLATIONS WORK BETTER

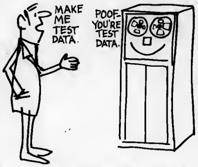
# ADR's MetaCOBOL™ System could double your COBOL productivity.



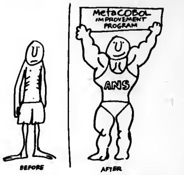
MetaCOBOL increases productivity in all phases of COBOL programming.



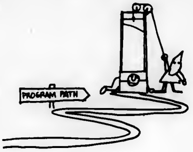
Allows installations to enforce their own COBOL standards.


MAKE ME TEST DATA.
POOF- YOU'RE TEST DATA.

Simplifies and automates the generation of comprehensive test data.



Permits program upgrading during COBOL-to-COBOL conversion.



Documents COBOL program path execution.

TRY IT. YOU'LL LIKE IT.

Evaluates COBOL programs for operational efficiency & inefficient statements.

ADR's MetaCOBOL not only increases productivity. It helps you manage your installation significantly better. MetaCOBOL is an ADR breakthrough in COBOL development, testing, debugging, maintenance, evaluation, measurement, conversion and standards control.

Shouldn't your COBOL installation gain these benefits, too? They're proven in use at over 100 companies. MetaCOBOL is 100% compatible with COBOL.

For further information, just send us the attached coupon, or contact any ADR office.

**APPLIED DATA RESEARCH** THE SOFTWARE BUILDERS®

**ADR software products: In use at over 2,500 installations worldwide.**

**APPLIED DATA RESEARCH, INC.**
SOFTWARE PRODUCTS DIVISION
Route 206 Center, Princeton, New Jersey 08540
Telephone (609) 921-6550

Yes, I'm interested in MetaCOBOL.

Name

Company Title

Address

City State Zip

Telephone

Computer Configuration

I am also interested in:

☐ The LIBRARIAN . . . for security and protection
☐ AUTOFLOW . . . for maintenance and debugging
☐ SAM . . . for planning
☐ ROSCOE . . . for on-line program development
☐ PI SORT . . . for faster sorting

U.S. offices in Atlanta, Boston, Chicago, Cleveland, Detroit, Houston, Los Angeles, New York, Pittsburgh, Princeton, St. Louis, Washington, D.C.
Representatives in Australia, Austria, Belgium, Brazil, Canada, Denmark, England, Finland, France, Germany, Italy, Japan, Netherlands, Norway, Puerto Rico, South Africa, Spain, Sweden, Switzerland, Taiwan, West Germany

## Without Revealing Personal Data

# Mass. to Get U.S. Drug Funds

By Marguerite Zientara
Of the CW Staff

BOSTON – The State of Massachusetts is still refusing to supply personal information to various Federal Government drug data banks, but without the threat of losing Federal funds.

In response to letters from Gov. Francis W. Sargent and Boston Mayor Kevin H. White stating they would do without Federal funds rather than supply Client Oriented Data Acquisition Process (Codap) forms [CW, Aug. 15], Peter Bourne, acting director of the Special Action Office for Drug Abuse Programs (Saodap), informed Marge Elzroth of the state's Human Services Department that Massachusetts would be exempted from participation in personal identification aspects of the Codap system.

"If Massachusetts will take the responsibility for providing aggregate data, that will be alright with us," Bourne told Elzroth.

Bourne said Massachusetts could elect to keep personal identification data at individual drug treatment clinics or in the state's Department of Mental Health.

Massachusetts then began moving against a second drug information program. In a letter being drafted last week, Sargent will instruct state drug treatment facilities – including hospitals and crisis centers – not to forward client-identifying information to Project Dawn (Drug Abuse Warning Network), according to Andrew Klein, aide to Sargent.

Dawn is a year-old project of the Justice Department's Drug Enforcement Administration, the former Bureau of Narcotics and Dangerous Drugs, aimed at acquiring information about existing and developing patterns of drug use. Dawn is operating in Massachusetts, but officials have refused to identify local participants.

Unlike Codap, Dawn involves no Federal funds and, according to Ernest A. Carabillo Jr., acting chief of the Drug Enforcement Administration's special programs division, participating hospitals and crisis centers are not required to forward identifying information if they object.

Carabillo said the program's reporting forms were changed earlier this year to include spaces for such information as Codap requires – subject's birth date, race, sex, the first two letters of the subject's mother's given name and the first two letters of the subject's mother's surname – at the request of Saodap, developer of Codap.

After the Federal Government informed Massachusetts of its decision about Codap. Klein said, "We decided we had to get word to the hospitals letting them know we thought the client identification section of Dawn was a bad, ill-advised program for them to participate in.

## Editorial

# The User's Choice

*(Continued from Page 1)*

a greater identity as the representative of the entire computer community.

Thus, business-oriented users would have a greater voice in planning the future National Computer Conferences, the biggest single Afips activity. And DPMA could salvage its annual conference as a high-level management/technical meeting, while eliminating the small exhibition that does little for the professional or technical betterment of the attendee, and less for the financial coffers of DPMA.

DPMA could also share in the revenues of the much larger NCC.

It is possible, of course, that DPMA would elect to keep the exhibit portion of its conference, a portion which has featured mostly supplies and accessories in recent years. A few of the Afips societies still conduct their own conferences, with and without exhibits. ACM has even changed the format for its "commercial program," as now for the second consecutive year the "exhibits" consist of formalized sales pitches for software products.

While the reputation of DPMA itself would be enhanced by joining Afips, members might argue against the loss of autonomy.

The fledgling Institute for the Certification of Computer Professionals would receive a financial boost if one of its biggest proponents joined the Afips community.

But the biggest benefit of all could be in the planning of the technical programs of NCC, plus the other workshops and seminars conducted by Afips during the "off season."

And more DP users would have a voice when Afips is called to testify before Congress, when bills affecting the computer community are debated.

Acceptance seems to be in the wind, for only last week DPMA reminded the press the deadline for the committee's recommendation was just around the corner. We doubt the reminder would have been issued unless the decision at hand were a momentous one – i.e., "we accept."

Since the DPMA is near completion, and since the committee will submit a formal report only two weeks after the Aug. 31 deadline, users should take advantage of this "eleventh hour" and make their preferences – and the reasons for those preferences – known to the committee.

The president of DPMA is Jim Sutton, chairman of the study committee. Users interested in voicing their opinion should direct correspondence to Sutton via Executive Director Donn Sanford, DPMA International Headquarters, 505 Busse Hwy., Park Ridge, Ill. 60068.

# Journal Details Line Discipline

By Ronald A. Frank
Of the CW Staff

WHITE PLAINS, N.Y. – When asked for details about the SDLC data transmission line discipline, an IBM spokesman said, "specific detailed information concerning implementation [of SDLC] will be made available when we ship to the first customer."

Despite this statement, the transmission discipline has been described in detail in at least one technical journal.

An article in the November 1972 *Proceedings* of the IEEE, called "Line Control Procedures," gives the most complete look yet at SDLC, outside of IBM. The article was written by James T. Gray, manager of the communication architecture studies department at IBM's research division in Research Triangle Park, N.C.

Before assuming its SDLC designation, the line discipline was called Advanced Data Communications Control Procedure (ADCCP) and, according to Gray, it was in the process of being "defined, standardized and introduced to data communications use." The article said ADCCP was also known as SDLC.

### Transparency Needed

"ADCCP starts with the premise that a line control should be code-insensitive and transparent to the characters in the text to be transmitted," Gray said.

"To achieve this transparency, a special control character called a frame is defined to be the bit sequence "0111110," that is zero, five ones, and a trailing zero. All transmissions are then constructed so that they begin and end with frames."

The message format of SDLC will take the pattern of

| | | | | | |
|---|---|---|---|---|---|
| F | A | C | Text | BC | F |

Where F is a frame as previously defined; A is an eight-bit address field; C is an eight-bit control field; Text is an information field of arbitrary length restricted only by the buffering constraints of the terminal stations involved and by the error characteristics of the channel; BC is a 16-bit block check field using the CCITT Cyclic Redundancy Check polynomial; and F is the terminal frame which may also be the lead frame of the next message block.

Transparency is achieved during transmission by scanning the "AC Text BC bits, five ones in a row and inserting a zero." This preserves the uniqueness of the frame on the line, the article said.

Since frames are unique, at the receiving station "AC Text BC" can be isolated and one zero deleted after every string of five ones. "AC and BC" are then positionally identified as the first 16 and last 16 bits of the resulting string and Text is everything else transmitted.

"Code sensitivity of asynchronous modems remains a problem," Gray said. To eliminate this, non-return to zero encoding of the data stream in employed."

Three message formats are defined, the article continued. The first format, described above, provides for normal half- or full-duplex message transfer between a primary and a single secondary station by defining a transmit sequence number and a receive sequence number, each of three bits, and a response bit for the primary station, which is also a final bit for the secondary station."

The second message format is: "Frame AC BC Frame," and is used by the primary station to acknowledge secondary transmissions or to request additional transmission, or to request retransmission, and to inhibit the secondary station from transmitting.

The third format is used for non-sequence transmissions and contains no sequence number. It may or may not contain a text field.

The article concludes that ADCCP fits a variety of operations including half-duplex; full-duplex; full conversational operation; hub poll operation; and operation in point-to-point, multipoint and loop facilities.

The architectural advantages of the code, according to Gray, are:

- Code independence.
- Full transparency.
- Unique synchronization.
- Full checking of data and commands.
- High efficiency in full duplex mode on channels with long propagation delays.
- No long-term mode switching.
- Capability to accept later controls and responses.

The exact similarity between the transmission discipline described by Gray and the SDLC version announced by IBM will not be known until IBM announces further details. It is believed the hub polling capability referenced by Gray will not be supported by IBM. And other discrepancies are possible.

IBM also said details of its DLC line discipline will not be released until the first remote 3704/3705s are delivered in February 1974. It is possible the relationship between DLC and SDLC will become more clear at that time.

# IBM's SDLC Should Aid Data Users

*(Continued from Page 1)*

users with extensive remote batch applications are expected to benefit.

According to IBM, there are five major advantages associated with SDLC for data users:

- The discipline is more efficient in interactive environments.
- It provides error checking for all elements within transmitted messages.
- It is transparent in that any bit pattern can appear in text.
- It uses positionally significant control.
- SDLC is bit-oriented rather than character-oriented.

Few IBM systems have yet been announced that will operate in SDLC mode. The line discipline was first mentioned with IBM's introduction of its 3600 Finance Communication System and the 3650 Retail Store System [CW, Aug. 22].

In addition, the 3704/3705 programmable communications controllers are compatible with SDLC terminal controllers such as those used in the finance and retail store systems.

A related line discipline called Duplex Line Control (DLC) was introduced when the 3704 was announced in February. But DLC is presently restricted to communications between a remote 370X and a 370X installed as a front end to a mainframe, IBM said. The exact relationship between DLC and the new SDLC was not explained by IBM but they are believed to be similar.

The basic SDLC transmission rate for the two point-of-transaction systems is 2,400 bit/sec with an optional 4,800 bit/sec speed available, IBM said. The line discipline allows both half-duplex and full-duplex operation. For short distances or where low capacity demand exists, users can utilize half-duplex SDLC mode while long distance transmissions would be more economical in duplex SDLC mode, IBM said.

On long distance links with multi-dropped terminals, one terminal could transmit while another terminal was receiving data over the same duplex SDLC circuit.

# When you're the leader, how do you follow the leader?

We introduced digital plotting.

For the last ten years, our drum plotters have set the standards of their industry.

Our 565, and the models we've built around it, have made us the largest manufacturer of drum plotters in the world.

But we've known for a long time that someone would come along with something new one day. What we've been working on, is making certain that the new leader would still be us.

Starting now, you'll measure drum plotters by our two new models.

First, the 936. It's faster and it has greater plotting quality than the unit it replaces.

And, it costs less.

Next, our top of the line 1036. It's almost twice as fast as the 936. And again, its plotting quality is higher and its price is lower than the unit it replaces.

We've increased performance and decreased the price of the drum plotter. And that's going to be a hard act to follow.

Call or write California Computer Products, Inc., CW-M8-73, 2411 West La Palma Avenue, Anaheim, California 92801. (714) 821-2011.

CALCOMP

# Files on DP Managers in 'Our Heads'

By Michael Weinstein

Of the CW Staff

Frequent allegations that vendors in general and IBM specifically keep written dossiers on individual data processing managers are untrue, according to a *Computerworld* survey of former IBM (and other vendor) salesmen.

Of the eight former IBM sales personnel now working in firms in direct competition with IBM, all stated they had neither seen nor heard of any written records.

Although records may not have been written during their employment with IBM, the salesmen and coworkers sometimes verbally spread and used information on DP professionals that could be helpful in sales efforts.

These efforts took two slants, they related, either recommending a DP professional with a history of running full and frequently upgraded IBM computer operations or trying to dissuade prospective employers from hiring a man who might change or mix systems and thus hurt sales.

One source stated in one case he was trying to sell a large multiprogramming system, but the prospective user had reservations about his firm's ability to run the larger system.

"I called other branch offices and asked if they knew of a good man who was looking for a job," he stated.

This led to finding a DP professional who was quite competent and oriented toward IBM who was brought in above the present DP manager and given the title of vice-president, manager information systems.

Another case cited was a former salesman who learned one of his biggest users was contemplating hiring a new DP manager who had previously been employed in Cincinnati.

When he called the Cincinnati office, he was told this particular individual would cause trouble.

The former salesman related how he had been able to support the present DP manager by indicating to management that he was highly competent for any expected increase in computer operations.

"This left us with a very grateful DP manager," he related, "and thus, a very safe and productive account."

Talks with former salesmen and present salesmen for other vendors indicate these practices are common to all mainframe suppliers.

But in every case, no one surveyed had any knowledge or had ever heard of any written dossiers.

"We keep it all in our heads," a Honeywell salesman said. "It is too dangerous to be on paper."

# City to Get DP Library on Drug Abuse

By Marguerite Zientara

Of the CW Staff

PHOENIX – A computerized library hooked up to Washington, D.C. – meant mainly for use by drug abuse and alcoholism professionals – will be installed in the Phoenix Public Library in September, despite local protests that the library should perhaps be located at a medical center where professionals maintain medical libraries, instead of in "an ugly stall" which would detract from the library's appearance.

Opponents claim the Phoenix library has been overloaded for years and it will take at least two years before a planned addition is built.

The Drug Abuse Communications Network (Dracon) has access to about 13,000 abstracts from drug literature, stored in a computer at the National Institute of Mental Health's National Clearing House for Drug Abuse Information in Rockville, Md.

Besides printouts, the communications setup can be used for requesting free educational materials from Washington, including films, pamphlets, books, and educational program units.

# The Good and Bad of It

## Give Him a Broom, It's Not His Day

NEW YORK – Wouldn't you like to know if this is one of those days you "should have stayed in bed"?

Well, Time Pattern Research. Institute says it can print out a year-long chart predicting your "good" and "bad" days.

The predictions, said Bernard Gittleson, president, are based on the theory of biorhythms, the science of life's "inner clocks" which regulate day-to-day existence.

Biorhythms are based on three cyles – emotional, intellectual and physical – of varying lengths. The highs and lows of the cycles determine the status of each day for each characteristic.

George Thommen, leading investigator of this science, has worked closely with the institute, to assist in programming a 360/40 to print out the annual reports. Each individual, depending on his day and year of birth, has a different biorhythm.

A number of Japanese companies, including Hitachi, have requested reports for their employees, Gittleson said. "That way, the foreman can assign a worker to low-risk jobs on the six to eight critical days each month."

## It Was Fun Working Anyway, Wasn't It?

NASHVILLE, Tenn. – Remember the good old days when it took a week to 10 days to get a Social Security card? Now that the Social Security Administration has begun using a central computer system in Baltimore to issue the cards, it can take up to nine weeks.

"Not all the bugs are worked out yet," said Tom Read, Social Security district manager, "and the computer simply has not caught up with the backlog."

The problem now is that many teenagers working for the first time this summer cannot collect their paychecks simply because they haven't received their cards yet. They say they may be back in school before they get their first check.

## 'Hmm,' Hom Asked, '1 or 2 Tickets for $2,186'?

SAN BRUNO, Calif. – This family fight cost Warren Wing Hom more than a black eye.

Investigating a family squabble, San Bruno Police arrested Warren Hom for disturbing the peace.

A routine computer check with the Police Intelligence Network (PIN) revealed the unemployed recreation director had a long list of traffic warrants after his name, most with fines set at $10 or $21.

When confronted with the list of violations, Hom said, "I was a little worried. I knew I had one or two."

Those "one or two," plus all the others, amount to $2,186.

# Computer Leasing Seminars

A series of computer financial leasing seminars will be presented jointly by Telex Computer Products, Inc. and Capital Marketing Corporation during September and October. Also in attendance at the seminars will be representatives from one of the largest financial institutes in the country. The seminars will cover financial and operating leases associated with IBM System 370 CPU's, Telex peripherals, and other aspects of profitability associated with leasing for the user.

**Two sessions will be held in each of the following cities on the dates indicated:**

| | | | |
|---|---|---|---|
| **San Francisco** | **Sept. 11** | **Detroit** | **Sept. 26** |
| **Los Angeles** | **Sept. 13** | **Cleveland** | **Sept. 27** |
| **Dallas** | **Sept. 18** | **New York** | **Oct. 2** |
| **Atlanta** | **Sept. 20** | **Boston** | **Oct. 3** |
| **Chicago** | **Sept. 25** | **Philadelphia** | **Oct. 4** |

Complete information on the seminars, their meeting times and locations is available from these Telex Area Managers:

**WALTHAM, MASS.**—Al Lucchese
460 Totten Pond Road (02154)
(617) 890-4910

**NEW YORK**—Frank Jerd
6 East 43rd Street (10017)
(212) 867-9780

**ROCKVILLE, MD.**—John Kerr
6110 Executive Blvd. #222 (20852)
(301) 881-7610

**MIAMI**—Bob McLeod
7600 Red Road. Suite 305 (33143)
(305) 661-7641

**CHICAGO**—Jerry Johnson
111 East Wacker Drive (60601)
(312) 644-5100

**SOUTH FIELD, MICH.**—Bill Bones
21415 Civic Center Drive (48076)
(313) 358-1195

**SAN FRANCISCO**—Bob Hicks
Fibre Board Building,
55 Francisco St. (94133)
(415) 398-4888

**ENCINO, CALIF.**—Ron Bromwell
16255 Venlura Blvd.,
Suite 401 (91316)
(213) 986-9252

**DALLAS**—John Joyce
11311 North Central Expressway,
Suite 206 (75231)
(214) 691-6861

**MAKE YOUR RESERVATION NOW.**

where the difference begins

TELEX.

the Preferred PERIPHERAL COMPANY
TELEX COMPUTER PRODUCTS INC
6422 East 41st Street • Tulsa, Oklahoma 74135 • 918 627-1111
TELEX, LTD
101 Duncan Mill • Don Mills, Ontario, Canada • (416) 445-8050
TELEX EUROPEAN GROUP
213 Oxford Street • London W1R 1AH, England • 01 734 9131
Paris • Frankfurt • Zurich

### Reporting Plan to Aid Safety

# Ontario Roads Closely Watched

TORONTO – The Ministry of Transportation and Communications uses a computer to monitor what are some of the world's most closely watched roads.

Since 1945, the Province of Ontario has built an accident reporting system that intends to give an accurate picture of the accident rate and traffic volume for every 500 feet of the 13,000 miles of highway in the province.

In early 1968, accident reports that had been processed by the former Department of Highways were fed into a computer. However, since the old collision report form was not designed for use by the computer, the Ontario Provincial Police, local police and the Department of Transport had to codify all the data, according to Paul de Valence, computer services project engineer.

One year ago, all police forces in Ontario began to use a new collision report form. "This form has taken us one step closer to complete automation," de Vaience said, "which will no doubt come within five years and is a tremendous achievement when you consider we have to process approximately 150,000 collision reports annually."

Out of all the data comes a book called *Traffic Volumes and Collision Rates.* "We watch the collision rates rather closely and if a particular stretch of road starts to record a collision rate higher than the provincial average, we identify it as a problem and try to find out what's wrong," said Tom Mahony, one of the originators of the program.

## Two Out of Five's Not Bad

MILWAUKEE – A "7" may look a lot like a "1", but "0" doesn't look anything like $80,990.

As the result of an input error, Crawford County's computer number, 12, was assigned to Wood County, whose number if 72.

This resulted in a cut in the Crawford County revenue-sharing payment, a cut which was intended for Wood County. The cut reduced Crawford's revenue-sharing check to zero, though it should have been $80,990.

Even though the error was discovered by the Office of Federal Revenue Sharing before the checks went out, no one changed the computer input. As a result, the county and 17 of the local governments within the county received underpayments.

Much to the relief of Crawford county, the correct amount will be paid, officials said.

## Hurricane Hunters Have Heavy Helper

WASHINGTON, D.C. – "Hurricomputer." That's what you get when you cross a hurricane with a minicomputer. And that's what the U.S. Air Force's Hurricane Hunters are doing, to quickly and accurately predict a hurricane's strength and the path it will take.

A minicomputer is part of the Lo-Cate System, designed by Beukers Laboratories of Bohemia, N.Y., that gives meteorologists the exact speed and direction of hurricane winds. Previously used satellite photographs showed only the storm's general movement.

The system uses Beukers' newly developed technique of signal retransmission to measure the wind in a hurricane by tracking an instrumentation package dropped into the storm from a plane.

The Data General Corp. Nova 1200, mounted in a plane, locates the package and then calculates the direction and speed of wind.

# There's No Lack of Data on Poor at Health Center

By E. Earl Richards

Special to Computerworld

ATLANTA, Ga. – They come each day, as individuals and as whole families, the young, the middle-aged, and the old, bringing with them all manner of social problems and all kinds of health needs. But mostly they come to the Atlanta Southside Comprehensive Health Center (ASCHC) with hope, for they are the urban poor, with incomes so low and with ailments so numerous that for the vast majority of them, it is the first time in their lives that they are able to receive continuous and quality health care.

At the very heart of the center is an information system committed to the belief that the residents in the target area are entitled to quality care, and there is no question that efficiency in information handling enhances the quality of the care given at the center.

### Over 200 Programs

Dr. E. Earl Richards

The ASCHC has an IBM 360/22 card, disk and magnetic tape system and a staff of 12 in the data processing department. Under the supervision of data processing director John B. Aycock, more than 200 programs have been written to support about two dozen different information systems.

Besides such standard bread and butter accounting applications as payroll, budget control, accounts payable, and purchasing and inventory control, this data processing system:

- Keeps and updates master records on 26,000 persons.
- Calculates the number and type of patient visits.
- Produces patient pharmacy profiles so that a physician can quickly scan the amount and type of drugs administered.
- Prepares special reports to assist the staff in evaluating utilization – to determine, for instance, when the demand on the center is greatest so that hours of service may be adjusted.
- Scores child behavior tests to help pinpoint the cause of a child's maladjustments.
- Controls an immunization history recall system that will, for instance, keep track of when a child is supposed to come in for an immunization and print out a notification to the parents.
- Totals and classifies all third-party billing, primarily for Medicaid and Medicare payments.
- Prints monthly and quarterly statistical statements.

In addition, the center expects, eventually, to add on-line visual display terminals to the system to make some type of patient profile instantly available, and to have better control over appointment scheduling and patient transportation arrangements to the center.

John B. Aycock, ASCHC's data processing director (in striped shirt), explains a point on a printout to Richards and Dr. Charles H. Hamilton, medical consultant and director of Team D.

At the center, a patient may be treated for any condition that does not require hospitalization. On the first day he comes in, his registration information is punched into cards and the cards processed on the computer. Then into the patient's medical record goes a red plastic card embossed with the patient's name and address, date of birth and patient number

Whenever a patient is seen by a physician, a team member fills in an encounter form and using the red card this form is imprinted with the patient's name and then sent to the data processing department.

The computer is useful not because it can plot a patient's respiratory data or "watch" his blood pressure, heart rate, or chest tube drainage – as numerous computers are doing at hospitals throughout the country – but because it can act as a tool to help evaluate the center's impact on the health of the community, as well as, potentially, giving vital data on the impact of disease upon the community.

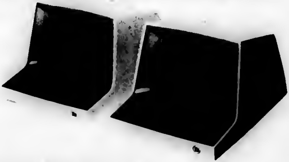
*E.E. Richards is project director, Atlanta Southside Comprehensive Health Center.*

**You no longer have to wait in line for a data terminal,**

**now you can afford two new ADM-1's.**

Two ADM-1 Terminals for the same investment you've been making for a single terminal. State-of-the-art design brings the ADM-1 into **the $1000 to $1600 range.*** And with even more capabilities: 960 or 1920 characters on a full-size 12" screen, complete 53 key TTY board, total cursor control, full editing capability with options, RS 232 point-to-point interface at Baud rates from 110 to 9600, underlined control characters, dual intensity protect mode, character repeat—all housed in a compact, 45 lb. answer to your budget, operations, and standing-in-line problems. Call or write for the ADM-1 brochure.

*OEM pricing available



LEAR SIEGLER, INC. / ELECTRONIC INSTRUMENTATION DIVISION
714 N. Brookhurst St., Anaheim, Calif. 92803, (714) 774-1010

To: Lear Siegler Data Products
714 N. Brookhurst St.
Anaheim, Calif. 92803

**I don't want to wait in line. Send me a new ADM-1 brochure.**

Name ____________
Firm ____________
Address ____________ Phone ____________
City ____________ State ____________ Zip ____________

## Editorial

# Iron Curtain

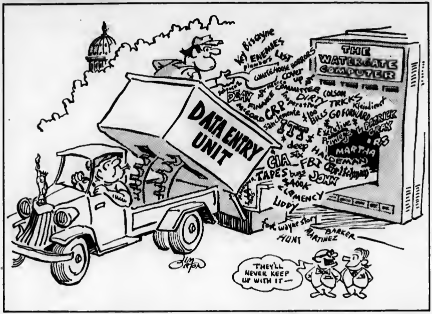
We have a long-standing and increasingly urgent interest in the performance of user groups. And if we are indeed approaching a one-supplier universe by the end of the decade, the current and successor IBM communities are exceptionally important.

*Computerworld* has requested that Share, Guide and Common grant us *ex officio* membership, giving access to information available to regular members such as rosters, newsletters and meetings announcements, and committee activities – without voting rights, of course. We specifically agreed to use the information carefully in the editorial department, and not to pass it on to our advertising or subscription people.

We had great hopes that Common would consent. Its April meeting in Detroit disclosed vigorous (and undoubtedly healthy) controversy about the IBM/Common relationship. Unhappily we have just received a formal refusal from President Charles E. Maudlin Jr. No word has yet come from Guide or Share.

This contrasts painfully with the open and pleasant relationship CW has with USE, the Univac group, and with other user communities. Whether this reflects vendor or user attitudes is conjectural; the result is favorable to the profession and, we believe, to the industry..

It is startling that the groups relating to IBM, which by the terms of the 1956 Consent Decree must be very careful about selective or premature disclosure of hardware, software or policy matters, exclude "outsiders" and trade journalists so completely.



# Letters to the Editor

## Model 15 Software Won't Run on Model 10

Regarding Michael Weinstein's article; "New S/3: A Software Release?", in the Aug. 15 issue, I agree that the S/3/15 announcement is predominantly a software announcement. Furthermore, IBM will probably make the software available to anyone who wants it.

Unfortunately, however, this software undoubtedly will not run on an S/3/10. Although the hardware changes were minimal, they are necessary for running the software and include more than just memory expansion.

First of all, the new software requires the use of the I/O interrupts announced for the Model 15 but not available for the Model 10.

Secondly, any enterprising memory manufacturer who decides to provide 128K of memory for a Model 10 must also be prepared to provide a considerable amount of additional logic since the Model 10 is unable to address more than 64K. Therefore, the new hardware instructions provided on the 15 must be implemented as well as the address translation table.

Considering some of the clever upgrades to existing computers which have been done in the past, such as Greyhound's Accelerator, it could be done. I hope it will, but it won't be soon and it won't be cheap.

David E. Ferguson
President
Group/3
Los Angeles, Calif.

## We Can't Even Measure DP Power

Michael Morris' interview [CW, July 25], on "speedometers" for computer system performance shows the lack of maturity of our industry. After a quarter of a century, we still don't have measures of computer power that are accepted in the industry. (See also Jack Paden's article, Page 27, same issue).

In fact, it's inconceivable to me that we in the computer field can presume to call our subject a science without commonly accepted units of measure. What is more important to computer service managers than a measure of the computer power of his machines?

The electric utilities have their kilowatts to rate their machines. Why can't we have our kilo-von Neumanns to rate the power of our computers?

The fact that the industry has not resolved this point indicates the shoddy state of affairs in the computer field today. To my knowledge, there is little theoretical work going on in determining a unit (or units) of measure of computer systems power. What subject could be more important to the user, the service provider and the manufacturer of computers?

P.A. Zaphyr, Manager
Computer Services and
Management Systems
Westinghouse Electric Corp.
Pittsburg, Pa.

A von Neumann ought to be a *big* unit of power, to honor a big man. Present day performance would then be measured in mieroneumanns. HG

## Power of the UID

Why not a UID? Certainly not for the reason you advocate. For one thing, a UID would not preclude misidentification, just as misidentification now occurs in the face of a multiplicity of identifiers on the same individual which permit triangulation.

Since the UID would discourage proliferation of additional identifiers, the burden of proof-of-identity would devolve on the UID solely. The prospects by which the UID would then have to be verified are ominous – e.g., photographs, fingerprints, voiceprints . . . tatoos.

While we are in complete agreement with your rejection of a UID on the grounds of economy and efficiency, and that "human values are more important," we do not think the overwhelming balance of human values is on the side of the UID. To the contrary, the UID facilitates the easy accumulation, transmission and linkage of personal data.

It is this *information* which stands subject to abuse, not the fact of identification, per se.

The vast majority of citations of abuse deals not with mistaken identity but concerns the misuse of information collected, the collection of misinformation and the reinterpretation of information generated in one context and stored in another – all of which may transpire without the individual's knowledge.

Byron Eckerson
Bradford Smith
University of Calif.
Santa Barbara, Calif.

**I thought the balance of human values was slightly, not overwhelmingly, in favor of a UID. As for triangulation, machine systems will not provide for it unless custom, professional pressure or legislation require it.**

**Incidentally, sophisticated UID proposals provide for check digits. HG**

# Fight 'Bait' Tactics of Vendor -- First Put It All in Writing, in the Contract

By Robert A. Bucci
Special to Computerworld

## Viewpoint

Concerning Alan Taylor's recent article, "Who Pays If a Proposal Doesn't Match the Contract"? [CW, July 25], the subject of responsibility for proposals containing promises that computer manufacturers fail to live up to needs airing.

The Angler's Co. Ltd. ongoing tale of woe should serve as a warning to the user community that the more things change, the more they remain the same – i.e., as in the days of yesteryear, when the going gets tough, computer vendors still reach for the old security blanket contract and point to a few magic words which they believe will absolve them of accountability and liability for their actions or omissions.

The prevailing philosophy appears to be that the purpose of the contract is to negate the positive statements and commitments contained in the proposal. Stated another way, the proposal pumps up the user while the contract takes the air out of his tires.

It is amazing that in this day and age with consumerism running wild, with truth and fairness permeating legislation – e.g., Truth in Advertising, Truth in Lending, Federal Fair Credit Reporting Act – that the commercial computer marketplace still has overtones of being a high stakes shell game, a throwback to the Barnum days.

It matters not whether the tactics employed constitute "bait and switch," "bait and wait" or some variation thereof; any way you cut it, it's shoddy business practice!

The counseling points for unwary users are obvious:

- If the decision to do business with a vendor is largely dependent on a support commitment contained in a proposal, that commitment should be made a part of the contract.
- The commitment should be clearly spelled out: What is to be provided? By whom? How is it to be done? When? What happens if it isn't done on time?
- If a user doesn't button up contract rights in the beginning when his bargaining power is substantial, he has no one to blame but himself if subsequent vendor about-faces or project delays put him behind the eight ball. He deserves to be left hanging by his thumbs, locked into an arrangement which will not give him what he originally bargained for.

For every situation like Angler's Co. Ltd., where it appears that the user has been victimized, there are many instances where Honeywell and other vendors have gone the extra mile in satisfying users regardless of what the contract said or didn't say.

But, the installation of a computer is too big an investment, too essential to the well being of a user's business, to be left to the good faith of the vendor.

I leave you with the following caveat: play it smart; put it in writing – in the contract. Never lose sight of the fact that "the road to hell is paved with good intentions."

*Bucci is a member of the New York and Massachusetts Bars, and is a former legal counsel for Honeywell Systems, Inc.*

# There Are No Errors in ANS Cobol, Version 4...

**By Mimi Macksoud**
Special to Computerworld

In the article "Errors Uncovered in ANS Cobol, Version 4" [CW, June 20], Kenneth Seidel accuses IBM of "sloppy workmanship" and "astonishing errors". However, close examination of Seidel's conclusions reveals many of these conclusions are themselves erroneous and unfounded.

Consider the following fields:

```
02 A PIC S9V99 COMP-3 VALUE +1.45.
02 B PIC SV99 COMP-3 VALUE ZEROS.
02 C PIC S9V99 COMP-3 VALUE ZEROS.
```

The statement MOVE A to B does yield a result +.45 in B, not 1.45 as Seidel claims. In addition, the statement ADD B to C yields the expected result 0.45. There doesn't seem to be a problem in processing fields which contain only fractions.

Seidel's complaints about the effects of not coding SYNC for binary fields are pointless. It is true that Version 4 does not automatically generate slack bytes for binary fields. However, this is a difference between Cobol F and ANS Cobol, including Versions 2, 3 and 4; it is not a change peculiar to Version 4. The "worst case handling" can be eliminated simply by coding SYNC for binary fields.

To be entirely fair, perhaps Seidel should also argue analogously that the compiler is sloppy because it generates unnecessary slow PACK and UNPK instructions, if he tries to process DISPLAY fields in arithmetic instructions.

By using COMP-3, instead of DISPLAY, efficiency improves. Similarly, by coding SYNC, efficiency is greater. The cost of a four-letter-word and a few slack bytes is a small price to pay.

## Viewpoint

Seidel's conclusions about the problems in comparing two non-numeric data fields of unequal length are also completely erroneous. There is no difference in the ways Cobol F and ANS Cobol handle this type of test. Consider, for example:

```
02 A PIC X (260) VALUE ALL '9'.
02 B PIC X (250) VALUE ALL '9'.
IF B IS LESS THAN A DISPLAY 'THIS TEST WORKS' ELSE DISPLAY 'THIS TEST DOES NOT WORK'.
```

In this case, results show that B is definitely less than A. If both fields are now filled with LOW-VALUES (Seidel's example), the comparison test no longer yields "valid" results; B will test as NOT less than A.

The reason for this strange discrepancy is quite clear and obvious after careful reading of the Cobol language manual and the object coding generated. For non-numeric operands, comparisons are made with relation to the collating sequence of the Ebcdic set: hex '40' through 'F9'.

The object coding generated shows that after the left-most bytes of the two fields are compared for equality, the remaining right-most bytes of the longer field are compared to spaces. If they are equal to spaces, then the two fields are equal. If they are greater than spaces, then the longer field is the greater. But, if they are less than spaces the longer field is paradoxically the smaller.

Both the Cobol F and Version 4 compilers generate this coding. In Version 4, the logic is the same whether one uses the CLCL or the CLC instructions.

So, Seidel's problem is not a "subtle difference" between Cobol F and Version 4 but a "subtle bug" in his program. Whenever unequal length fields are filled with characters less than '40' in the Ebcdic set, the results are going to be problematical.

### What Documentation?

Finally, Seidel seems rather distressed that he doesn't know what to do with the SYSDTERM dataset messages generated by the symbolic debugging options. He is correct in stating that no documentation exists for this feature; at least I haven't found any yet. Since this dataset doesn't seem to be essential to the FLOW, STATE, and SYMDMP options, I look on its omission as a source of humorous embarrassment to IBM, not an "astonishing error" in the compiler.

If the SYSOUT messages bother Seidel so much, I recommend that he code SYSDTERM DD DUMMY when he uses these compiler options.

I base all these conclusions on work with the Cobol Version 4 compiler run under OS/MVT on a 370/165. I doubt whether TSO and ASP would affect compiler output very much.

# ...Or Are There?

**By Ken Seidel**
Special to Computerworld

I believe Mimi Macksoud is wrong in every case, except the first, where she simply denies that what did occur at the Hughes Computer can be replicated at her computer.

1. Failure to obey picture (packed decimal truncation omission): Evidently her compiler did not possess this error when tested recently by her; our discovery actually occurred and was fixed.

2. Extra MVC to refer to non-SYNC binary items: She missed the point completely, then introduces an irrelevant hypothesis of my objecting to "unnecessary" PACK or UNPK instructions. The point is, in the 370 the binary-access MVC instructions are unnecessary, in an absolute sense, but PACK and UNPK accomplish unique functions not possible in any other straightforward way. Of course, all this is avoided if one writes SYNC, which I do inevitably. But many other users don't, and IBM creates artificial penalties then.

3. Non-numeric comparison: The subtle difference I discovered has been conceded by IBM. While lash compiler functions as it is specified, these two rules are non-identical. Macksoud's detailed counterargument reveals the source of her misunderstanding – she doesn't consider her Ebcdic character set in all its 256 character glory; her universe consists of only the 029-printing-keypunch set. Thus, her statement "whenever unequal length fields are filled with characters less than X '40' the results are going to be problematical!"

## Rebuttal

4. SYSDTERM: Macksoud seems under some compulsion to defend IBM from the terrors of attack by Ken Seidel! Of course, its legal staff is sufficiently numerous to do that, if it becomes necessary. For my own part, I won't let IBM's bigness frighten me from legitimate criticism, which I will always restrict to factual technical levels, as I have done in the past.

# Reader Response Indicates Bait and Wait Occurring

The problems that Angler's Co. Ltd., Flushing, N.Y., became involved in when Honeywell Information Systems promised to install a turnkey operation by June 15 were detailed in earlier reports. The Aug. 1 Taylor Report asked if the practice was widespread and provided a questionnaire for users' responses. Here are some of the responses already received.

If you have anything to add, or an experience to relate, please write or use the questionnaire printed alongside.

### CPU Confused With System

Our problem was changing vendors. In March, IBM led me to believe it would not be much of a problem to install a System 3/10 by the middle to the end of August. My current system is being removed Sept. 15, so I was looking for three to four weeks conversion and parallel operation. This will not happen. [The central processor is due for September delivery – but the tapes will not be there until October – A.T.]

**The Taylor Report**
**By**
**Alan Taylor, CDP**

The problem became evident between contract and implementation, and resulted in the delay of scheduled implementation.

It looks as though the supplier should have been able to advise us of the problem earlier than he did. When the problem was noticed the local sales office took full responsibility, and so far is attempting to have it corrected to our satisfaction. However, to date, no correction has been possible.

I am not at all happy about the final results or the way the problem is being handled. – F.P. Bruzenski, Manager of Information Systems, Philadelphia, Pa.

### Snafu Means Incompatibility

Our problem was a DEC PDP-11 which was promised for delivery by January 1973. Partial delivery came in April after threats of cancellation brought two verbal promises of a February delivery and one written promise of a March delivery. Some of the original equipment will not be available until the fall, so we switched to alternate equipment in late July. The new equipment is not compatible with the existing software – RSTS.

We recognized the problem after partial implementation, and this resulted in the delay of scheduled implementation – and the loss of four months' revenue.

The supplier appeared to have had definite warning that the problem was coming before he told us about it. In fact, delays and reports were published before we were notified. When the problem was noticed the supplier took some responsibility and placed some blame on us.

*(Continued on Page 10)*

## Have *You* Been Baited and Waited?

If you have had any problems during the installation of small systems – such as the Honeywell 58 or the IBM System/3, etc. – please fill in this questionnaire so we can see whether there is a significant trend.

After filling out the questionnaire please return it to Alan Taylor, 633 Central St., Framingham, Mass. 01701. Your answers will be held in strict confidence if you so desire.
Thank you.

1. Briefly, what was your problem?

2. What system were you considering?

3. When did the problem become recognized?
   - ☐ Before contract
   - ☐ Between contract and specification
   - ☐ During programming and before implementation.
   - ☐ After implementation.

4. How serious was the problem to you?
   - ☐ An unexpected change, but not really inconvenient.
   - ☐ Inconvenient, but not really serious.
   - ☐ Serious, but not sufficient to halt implementation.
   - ☐ Resulted in the delay or cancellation of scheduled implementation.

5. How well did your supplier act in advising you of the problem?
   - ☐ He could not have been expected to see the problem before he advised us of it.
   - ☐ It looks as though he should have been able to advise us of the problem earlier than he did.
   - ☐ He appears to have had definite warning that the problem was coming before he told us about it.

6. How well did your supplier act when the problem was noticed?
   - ☐ He took full responsibility, and corrected it to our satisfaction.
   - ☐ He took some responsibility, and placed some blame on us.
   - ☐ He effectively placed the blame for the problem on us.

7. How happy are you now about the final results of the way the problem was dealt with?

8. Should the information you have given in this survey be treated confidentially?
   ☐ Yes ☐ No

Name____________________

Title__________ Telephone No.__________

Company____________________

Address____________________

# Readers Indicate Bait and Wait Occurring

*(Continued from Page 9)*

We are unhappy with the final results because of the long delays, but we like the equipment. Our eyes are wide open for the next time. – Name Withheld

### Poor Implementation

IBM was scheduled to implement an accounts payable system May 1, 1973 on a System 3/6. One week before the deadline the IBM marketing representative informed us that because of an increased field size the system would not be implemented on time. The following week IBM's programmer was on vacation. Since then we have implemented two other systems, and neither was on time.

The supplier appeared to have had definite warning that the problem was coming before he told us about it, but when the problem was noticed effectively placed the blame for the problem on us.

The system is now working, but the way it was implemented was not acceptable to us. – C. Van Cott, Programmer, Unadilla, N.Y.

### Firm Refused to Deliver

My problem was that CMC bid a "5" data entry system to win the bid. They apparently refused to deliver a few weeks before scheduled delivery – and so we had to take a "7" at more money.

I believe the supplier should have been able to advise us of the problem earlier than he did. When the problem was noticed the supplier took full responsibility, but did not correct the situation.

I am not at all happy with the way the problem was dealt with, and we now are going to another vendor. – Name Withheld

### RPG, Fortran Unusable

My problem was that NCR does not fully support Cobol or other languages in compiling or using the full 812 byte, 32K sector 657 disk. We spent many hours and days implementing full utilization. Now we cannot use RPG or Fortran with 812-byte blocks – although our systems use multiples of this block size.

We were trying to convert to the NCR 200 with 657 disks. The problem was recognized during programming and before implementation. It was serious – but not sufficient to halt implementation.

The supplier appeared to have had definite warning that the problem was coming before he told us about it. When the problem was brought to the surface by us the supplier took some responsibility and placed some blame on us.

The problem has still not been solved. – J. Frederick, Director of DP, Jackson, Mich.

### Time-Sharing Not Available

Our problem was that commitments made by the supplier (Honeywell) were not met. The capabilities of the system recommended by Honeywell did not come to fruition.

We were considering time-sharing and the problem developed during programming and before implementation.

The supplier should have been able to advise us of the problem earlier than he did. When the problem was noticed the supplier effectively placed the blame for the problem on us.

We cancelled the contract and refused to pay Honeywell for expenses incurred. – Name Withheld

### Promised, but Not Available

Our problem centered around an attempt to go to a System/3 card system with 8K. IBM grossly oversold its capabilities, and had promised support but it evaporated. We had to spend a lot of time and money deciding what we could do without using disks and printers which were not then available.

The problem turned up during programming and before implementation. At that time, it was serious but not sufficient to halt implementation.

The supplier appeared to have had definite warning that the problem was coming before he told us about it. When the problem was noticed the supplier took some responsibility and placed some blame on us.

We were not at all happy with the final results so we cancelled one month before delivery, and went to NCR Century 100 with 16K. – Garry Mullennix, EDP Manager, Huntington, Ind.

### Bill Double the Expected

Our problem was that NCR quoted $529 per month for COM service – but then billed us $1,100 per month. Meanwhile we bought all new readers for our clients. It would now be very costly to back off.

The problem hit us full blast after implementation when the first month's bill arrived, and it was too expensive to halt implementation.

The supplier did not advise us of the problem – we told him!! When the problem was noticed the supplier took full responsibility, but did not handle it to our satisfaction. He just said the estimate was bad.

We were not at all happy with the way we were hooked in, but we have no alternative. – D. Isacksen, Executive Vice-President. Palantine. Ill.

## Australia's Hairy Problem

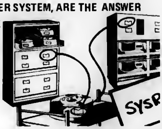
SYDNEY, Australia – Radical changes in wool marketing and handling are being advocated by a board member of the Australian Wool Corp., F.M. MacDiarmid.

MacDiarmid said the wool industry could cut costs if it eliminated many handling processes and wool was sold on a worldwide basis by computer.

He said the Wool Corp. could sell a sample wool clip by computer description.

SLAP-TAG®S, UTILIZING THE UNCANNY "HOOK & LOOP" TAPE FASTENER SYSTEM, ARE THE ANSWER FOR EXTERNAL DISK FILE LABELING.

OETAILS FROM:
HEXCO, INC.
80X 55588-SW
HOUSTON, TEX.
77055



Who can sell computers in Japan?

Shukan.

In Japanese it's called *Shukan Computer*, and in English, it means "Computer Weekly." Whatever you call it, *Computerworld*'s new sister publication is an excellent vehicle for selling EDP products and services in the large and expanding Japanese EDP market. Here are some of the reasons why

- **Shukan Computer** is a joint venture of *Computerworld* and Dempa Publications, the leading Japanese publisher of electronics information services. With the combined resources of the two companies, Shukan has the largest news gathering organization of its kind in the world
- **Shukan Computer** is the only newsweekly for the fast growing Japanese computer community
- Initial circulation is guaranteed at 35,000, divided about 80% to end-users and 20% to the computer industry. Circulation development methods currently under way are the same as those which gave *Computerworld* the highest paid circulation in its field in less than four years
- **Shukan** lets you in on the action in the world's fastest growing EDP market. The Japanese Ministry of International Trade and Industry (MITI) has made the following 1976 forecast: 39,000 general purpose systems installed, up from 11,237 in 1971; 11,000 minicomputers installed, up from 1,670 in 1971, and 3,000 industrial systems installed, up from 1,086 in 1971.
- Is this growth likely? The latest census of general purpose systems revealed that there were 14,806 systems installed as of September 1972, a one year gain of 3,569 units and $911 million installed value, a growth of 31 7% and 23 1% respectively. And more than 50% of these new systems were American made
- It is true that there are import restrictions. But Japanese vendors and users can get permission to import almost anything they want and need. As a result, 1972 imports were over $360 million
- Advertising in Shukan is easy. With *Computerworld* representatives across the U S to assist you, it's easy to place space in Shukan. For a small fee, we can translate and type-set your ad from English to Japanese. To get more facts, just send in the coupon

To: Neal Wilder, *Vice President*
**COMPUTERWORLD**
797 Washington Street
Newton, Massachusetts 02160

Please send me more information on *Shukan Computer* advertising.

Name ____________________

Title ____________________

Company ____________________

Address ____________________

____________________ Zip ________

COMPUTERWORLD

# SOFTWARE&SERVICES

**Congratulations**

## Packages Cited In Honor Roll

MOORESTOWN, N.J. – Seventeen proprietary software packages have been elected to the 1973 Datapro Software Honor Roll on the basis of their outstanding performance as judged by their users.

Each of the packages, including two from IBM, was rated excellent in the key category of overall user satisfaction by respondents to Datapro Research Corp.'s first survey of user/subscribers.

The list shows nothing but systems support/utility packages, one observer noted, probably indicating a continuing mistrust of application logic that was "not invented here."

Each of the honored packages was used by enough users, a Datapro source noted, to make the evaluation meaningful. Several other packages also received excellent ratings but from too few users to justify a place on the honor roll.

The honor roll packages and their suppliers include: Alltax (Management Information Service); Amigos (Comress, Inc.); Dump/Restore/Copy (Westinghouse Tele-Computer Systems Corp.); DUO 360/370 (renamed UCC TWO; University Computing Co.); DYL-250 (Dylakor Computer Systems, Inc.); Easytrieve (Ribek Corp., marketed by Pansophic Systems, Inc.); Epat (Software Design, Inc.); Grasp (Software Design, Inc.); The Librarian (Applied Data Research, Inc.); Panvalet (Pansophic Systems, Inc.); Power (IBM Corp.); Quikjob (System Support Software, Inc.); RPG II (IBM Corp.); Score (Programming Methods, Inc.); Spooler (Boothe Computer Corp.); Syncsort (Whitlow Computer Systems) and Total (Cincom Systems, Inc.).

To compile this list, Datapro 70 asked its 5,000 subscribers to summarize their experiences with software packages, with the request that they be specific by package in their comments. Responses were received from 191 users, Datapro said, and they reported on 174 packages.

Forty of these were rated by three or more users and of these, the 17 that earned an average rating of excellent based on several questions, were named to the honor roll.

The complete results of the software user survey are contained in a special report, *User Ratings of Proprietary Software*, which is available for $10.

Datapro Research Corp. is at One Corporate Center, Route 38, 08057.

### Correction

The GTE Accounts Payable/Financial Management System [CW, Aug. 15] is available under license agreement for a one-time charge of $14,400.

### 'Super Check' Basic EFT

## Package Cuts Bill Paying Paperwork

By Don Leavitt
Of the CW Staff

NAPERVILLE, Ill. – Commercial banks can simplify the work of their operations departments, their checking account customers and merchants with whom they do business, with the addition of Super Check software from Bob White Computing and Software.

Super Check, linked to a bank's demand deposit (checking) accounting application, comes close to being a complete electronic funds transfer (EFT) system, a spokesman admitted.

### Easing the Flood

The operations people have an easier time because Super Check eliminates much of the flood of individual checks that still must be processed by the banks and clearinghouses.

Less paperwork is needed because the checking account customer writes only one Super Check with multiple payees, during whatever pay period he arranges with the bank. The Super Check is in fact a turnaround document generated by the bank, listing all merchants, insurance companies or other payees the customer has requested to be carried on his file.

The document shows year-to-date payments for each listed payee, and provides a space in which the customer can fill in any amount he wishes to pay the particular payee during the current cycle.

Within the bank, the customer's account is debitted for the total amount of the Super Check, and the separate payments are distributed to the designated payees. If the payees are themselves customers of the bank, the payment is made directly to their accounts.

Otherwise, all payments for a merchant or other payee are accumulated during the Super Check processing cycle and a single check is generated for the payee at the end of the processing run.

### In His Sequence

Whether or not the payee has an account with the bank using Super Check, the system generates a report for him of the individual payments received that cycle in his customer number sequence so that he can distribute them properly within his receivables accounting.

The Super Check user can update the list of payees carried on his file by simply adding new names to the turnaround document or striking old ones from the prepared list. He can also break down the total payment for any payee into budget category in which case he will be furnished year-to-date figures by category as well as by payee.

### Less Worry About Quality

The merchant or other recipient of Super Check payments not only has less paperwork but he has less worry about the quality of the payments as well, a company spokesman said.

Super Check has been implemented on IBM 360/370 mainframes and takes a minimum of 28K bytes of storage. It is written in BAL, and Bob White sells the entire package for $15,500, including training in the marketing approach the bank should use to sign up merchants and checking customers. The software by itself – both source and object code (and documentation) – costs $10,000.

The vendor is at 830 Diane Lane, 60540.

## 'Safegard' Uses Transient Keys To Code, Decode Data Files...

TROY, N.Y. – Data files used by programs executing under any 360/370 operating system on a 360/25 or larger CPU can be made completely secure from unauthorized users through the four subroutines that make up the Safegard system from Digital Solutions.

Safegard encodes user-chosen data fields, including an entire record if required, according to an algorithm which is selected by specification of a 16-character key. The data is decoded, for use within an application program, only if the proper key is specified.

### Files Invulnerable

In this way, the company noted, the files are never vulnerable to stand-alone utilities or to operational error. Further, the keys used by Safegard need not be stored on secondary storage where deliberate or inadvertant access might be possible.

For further protection, the key specified to Safegard at execution time is destroyed as soon as the encryption algorithm is selected.

On a 360/50, the actual encryption/decryption key need not be present in memory for more than 700 µsec.

Safegard is designed to protect files whether they are accessed in local, remote, time-shared or batch operation. It functions equally well in DOS, OS, VS and Asp or TSO options.

Any numeric, alphanumeric or alphabetic information can be processed including object decks and load modules, Digital noted. Since any of the Ebcdic or Ascii characters can be used to make up the key, some 2.2 x $10^{35}$ possible encryption algorithms exist.

Additionally, each distributed copy of the Safegard package uses a unique algorithm to generate the encryption/decryption mapping. Thus knowledge of the key used by an installation to encode a file is not enough to decrypt the information. The very same Safegard program used to encrypt the file must be used to decipher it as well.

Safegard is written in Assembler and requires about 1K of memory. It is distributed in object deck form, with documentation and examples, for a one-time price of $250.

Digital Solutions can be reached through P.O. Box 424, 12180.

## ...'Sourcegard' Saves Programs

NEW YORK – A disk-oriented source program protection program for IBM 360 users, Sourcegard from Datasonics prints the version number, program name and compilation date whenever a program under its control is executed.

In many respects Sourcegard is very similar to a number of librarian packages. It allows up to 99 versions of a program to be maintained in a disk library, and can produce an audit trail of all changes.

### Validation Feature

Once a program is put under Sourcegard control, all changes to it must be made through the system. A validation feature can detect discrepancies between the source and object programs, the vendor said.

Data compression and scrambling techniques are used to save storage space and to protect the library. Beyond that, password protection is used to prevent unauthorized access to the programs.

Management intervention is required to change a password, delete a program, delete versions of a program, punch a source deck or create temporary changes in a stored program.

Sourcegard uses direct access files and no reorganization of user files is needed. Nor is it necessary to pass an entire file to access a single program. Standard JCL and I/O functions are used.

Program statements are resequenced by the system as the programmer revises his logic and, in general, the system supports a variety of clerical functions so the technician can concentrate on technical tasks.

Sourcegard itself is self-relocatable and uses device-independent work files. It is written in Assembly language and is intended for 360/22 and larger CPUs.

The system is available on perpetual lease for $1,500, which includes maintenance for the first three years. Monthly payment plans are also available, the company said from 663 Fifth Ave., 10022.

Nobody Schedules Multiprogramming the Maximum Advantage Way... Except Our Customers

Scheduling Tools for
OS/MFT and VS1
OS/MVT and VS2
DOS and DOS/VS

Value Computing's customers have a tool, our Scheduling System, in the hands of their schedulers that pays off big. With Value Computing, schedulers don't just schedule, they also optimize the loading and balance of the entire computer system. Benefits frequently experienced are:

- productivity increases of 20-40%
- savings of hundreds of thousands of dollars
- improved operational control
- better service to customers
- a new ability to plan ahead
- new tools for measuring people and system productivity
- lots more

If you want these benefits, you have a responsibility to fill out and mail this Value-able coupon.

value computing inc.

Value Computing Inc.
496 Kings Highway North
Cherry Hill, New Jersey 08034

Value Computing Inc.
496 Kings Highway North
Cherry Hill, New Jersey 08034
I'm interested in More Details:
☐ About Your Computer Scheduling Systems
☐ Have a Salesman Call
☐ I Don't Believe You, But I'll Listen

Name __________
Title __________
Company __________
Address __________ ZIP __________
Telephone __________

## Software Also Vital

# End Users, Managers Aid Small DP Staff

**By Don Leavitt**
Of the CW Staff

ERIE, Pa. – Organized involvement of end-user departments right from the beginning of DP projects that concern them, effective reporting techniques for management, and good software tools to support the programmers make it possible to run a good sized installation with a small staff, according to John J. Prehoda, manager of corporate computer systems at American Sterilizer Co. (Amsco).

The company has two 360s at its data center here, a Model 50 with 512K and a Model 40 with 256K main memory, both running under DOS. Peripherals include 14 Telex 2314-type disk drives, five Telex 2400-type tape drives, a Telex printer and some 43 Bunker-Ramo terminals, installed both locally and in remote sites.

To support this configuration, Prehoda has four programmers, seven systems analysts and a carefully chosen collection of software packages and other support tools.

To maintain good control, the company has designed many of its newer applications on data bases supported by the Total data base management system from Cincom Systems. Total, as a tool, made it possible to do a lot of things, the manager said. It is fast enough so that Amsco can do on-line updates, and comprehensive enough to allow the company to build the base it feels it needs. Right now, the system has 49 files in an on-line system, and Total manages all of the interrelationships that the application programs must be able to access.

Amsco is a long-time Total user, but it wasn't the company's first choice. Back in 1969, the DP staff had created an Isma file based system with a "homemade" teleprocessing monitor for a small terminal operation. The system had most of the company's manufacturing data on it, but it couldn't support on-line processing. In 1970 Amsco began the move to Total.

But as fast as it is, Total isn't a cure-all. The individual application programming, in Cobol, still has to be well done to benefit from Total. "If we used Total poorly," Prehoda mused, "we'd very quickly process data poorly."

Amsco's faith in Cincom products seems fairly firm, however, in view of the fact that it has just completed installation of a full on-line processing system, based on Cincom's Environ/1 teleprocessing monitor.

### End Users Participate

Prehoda's group doesn't do all the DP work at Amsco, nor would he want it to do so. Instead, the company has active systems groups in the various end-user departments, and they are responsible for initial development of any new proposals. To aid them in this work, Amsco uses the Pride package of planning manuals from M. Bryce & Associates, Cincinnati, Ohio.

Though not in itself software, the Pride approach allows these user groups to frame their early analysis work in a standardized form, before presenting it to a steering committee for further consideration.

While Pride keys to individual projects, the Project Control (PC/70) programs from Atlantic Software provide Amsco management with "good reports" on all projects that are underway at any one time. Amsco "always" has projects on the fire, Prehoda said, and PC/70 is important because of the number, but not necessarily the complexity, of the projects.

To aid in its own internal operations, the DP staff utilizes both the Panvalet source librarian system, from Pansophic Systems, and the Westinghouse Tape Dump/Restore package. Panvalet avoids the problem of controlling source programs in card form, and Westinghouse's utility eases the periodic capture of disk files for backup protection.

Prehoda noted that Amsco tried to have a data base administrator to control what went into the Total files "but we ran into problems. We couldn't seem to come up with anyone who knew all the data bases and all the file requirements as well as the systems analyst who designed them in the first place."

The responsibility finally has been shifted to a committee of senior people, he said, made up of project leaders, the manager of systems analysis and programming, and himself. When a user department asks for something new, the committee looks at what is already on the file and tries to determine if it would be appropriate for the apparently new need.

keep it quiet

- Line printers
- Terminals
- Data communications

Gates quiets any noisy machine at the source.

Our attractive, easy-to-install enclosures are so effective you can use the machine where it is needed most.

Write for our new brochure or call toll free (800 358-8265) today. Over 200 models available.

Gates Acoustinet, Inc.
Box 1406CW
Santa Rosa, CA 95403

Send me your new brochure.

Name__________
Address__________
City__________
State__________ Zip__________

GATES

Compare Cost And Capability

Wyle 8000 vs. IBM 2260

A quick look at the chart below proves that Wyle's Series 8000 CRT display system has far more capability than IBM's 2260 2848

Up to 40% depending on the configuration Plus a substantial reduction in electrical and air conditioning costs because of our solid state design

| Feature | IBM 2848/2260 | Wyle 8000 |
|---|---|---|
| 1920 Character CRT | No | Yes |
| CRT's Per Controller | 8 or 16 | 18 |
| Non-Destructive Cursor | Optional | Standard |
| Colon Seeking Tab | Optional | Standard |
| Line Address | Optional | Standard |
| Character Address | No | Standard |
| Character Insert | No | Standard |
| Character Delete | No | Standard |
| Erase Display | Standard | Standard |
| Erase End Of Line | Optional | Standard |
| Erase End Of Screen | Optional | Standard |
| Repeat Key (All Char) | No | Standard |
| Printer (Optional) | 15 cps | 100 cps |
| Columnar Tab | No | Optional |
| Lower Case Alphabet | No | Optional |
| Function Keys | No | Optional |
| Numeric Inset | Optional | Optional |

And when you decide on your Wyle system, you'll begin saving money from day one

How much?

So get the whole story of the Wyle 8000 Write for our brochure or phone the local office of Genesis One

WYLE COMPUTER PRODUCTS, INC.
A Subsidiary of Wyle Laboratories
128 Maryland St El Segundo CA 90245 (213) 678-4251

30 characters-per-second "Silent 700*" portable data terminal.

$2780. Immediate delivery.

In the office or on the go, the *Silent 700 Model 725* portable data terminal puts your computer as close as the nearest telephone.

The *Model 725* is equipped with a built-in acoustic coupler and is packaged in an attractive carrying case.

Features include high speed half- or full-duplex operation and quiet, non-impact printing.

Field proven reliability. Records show an average of only 1.2 service calls per year on the thousands of terminals in use.

Field service is as near as the offices listed below.

Low cost. Quantity one purchase price is only $2780.00. Lease prices range from $100.00 to $145.00 per month, maintenance included.

For more information, contact your nearest TI sales office or Texas Instruments Incorporated, P. O. Box 1444, Houston, Texas 77001, or call (713) 494-5115, ext. 2124.

*Trademark of Texas Instruments Incorporated

Arlington Va (703) 525 1444 Atlanta Georgia (404) 458 7791 Chicago Illinois (312) 671 0300 Cleveland Ohio (216) 464 1192 Dallas, Texas (214) 238 5318 Dayton Ohio (513) 294 0774 Denver Colorado (303) 758 5536 Detroit Michigan (313) 353 0830 Hamden Conn (203) 281 0074 Houston Texas (713) 777 1301 ext 261 Los Angeles Calif (213) 360 1378 (714) 547 9221 Minneapolis Minn (612) 835 5711 Newark N J (201) 574 9800 Orlando Florida (305) 644 3535 Philadelphia Penn (215) 643 6450 San Francisco Calif (408) 732 1840 Waltham Mass (617) 890 7400

TEXAS INSTRUMENTS
INCORPORATED

# COMMUNICATIONS

## Data Briefs

### System Uses Phones and Mini To 'Recognize' Voice Prints

SCOTTSDALE, Ariz. – Datawest Corp. has brought out a "Voice" System (Voice Operated Identification Computer Entry) that digitizes a voice coming over a telephone and compares it to a stored version to identify an individual by his or her voiceprint.

A telephone is the only needed terminal. The minimum system consists of eight lines and is expandable to 128. The system can stand alone or be interfaced to virtually any host computer, according to the firm.

In the system, the voice of the person saying his name or number goes into an analog-to-digital coverter and then into a "convolver/correlator" which is the pattern recognition device. This makes a 4K point comparison in 50 µsec, a spokesman said.

The data then goes into a DEC PDP 11/05, which temporarily stores it and directs its entry into a host CPU for a match with the master voiceprint. A standard voice response unit then replies.

Price of the eight-line system is $150,000 with delivery in five months from 7333 East Helm Drive, 85260.

### Gould Has Printer/Plotter

NEWTON, Mass. – Gould, Inc.'s Data Systems Division has combined a 3,000 line/min printer with a plotter in its Model 4820.

The unit prints up to 3,000 lines of alphanumeric data per minute and plots graphic material up to 75 sq in./sec. It has a resolution of 80 dot/in. vertically and horizontally.

The 4820 accepts data via direct memory access channels for on-line operations. Because of its data requesting format, the printer operates at full speed without dedicating the computer to the printer.

The unit can be used with CRT systems that utilize a raster-type output. It can take digital data directly from the CRT's refresh memory and can be used with graphic terminals for interactive applications.

The Gould 4820 printer/plotter costs $10,900 with delivery in 60 days from 20 Ossipee Road, 02164.

### Serializing Coupler Due in '74

SOUTHPORT, Conn. – Science Accessories Corp. will introduce a serializing coupler early next year that converts digital data in parallel form into serial form for transmission over communications lines.

The unit can accommodate up to 48 parallel bits of input data at TTL logic levels – 0 and +3.5 Vdc.

The CC-4 coupler costs $950 with first quantity deliveries in the first quarter of next year from 65 Station St., 06490.

## Union Pacific Network

# 'Coin,' 155s Track 50,000 Freight Cars

By Ronald A. Frank
Of the CW Staff

OMAHA, Neb. – Can a railroad successfully keep track of 50,000 freight cars which are shifted and reassembled to form thousands of trains each day?

The Union Pacific has solved this complex problem by configuring a customized computer/communications network specifically designed to handle railroad information. At the heart of the 252-terminal nationwide network are two 370/155s at the Union Pacific DP center in Omaha.

The railroad system is called Complete Operating Information system (Coin). It is written using Tcam level four B and is one of the most complete communications software systems developed specifically to handle railroad problems, according to Paul Sturgeon, manager of systems programming.

### Terminals Mixed

The Coin system uses a mix of terminals that includes IBM 1050s operating at 200 bit/sec; 2780s operating at 2,000 bit/sec; and TTYs, both Model 28s and 35s, operating at 110 bit/sec.

The network includes coast-to-coast routes with a mix of railroad-owned microwave links and Bell private-line facilities. From Seattle to Los Angeles and east to St. Joseph, Mo., Coin uses voice-grade lines derived from its private microwave transmission system. From St. Joseph east, Coin interfaces with AT&T 3002 lines connected to local Union Pacific offices.

The terminals are polled about once every 10 seconds by one of two IBM 3705 front ends installed at the central DP site.

The 3705 controls all communications procedures on the Coin system. The network includes 178 multi-drop AT&T lines in the East in addition to the microwave segment owned by the railroad.

Once each day all sites get a traffic report listing car movements, trains that will enter a particular area within the next operating period, and other information that applies specifically to the remote site receiving the report.

As soon as a train is made up, a card deck is "dropped into the 1050" and the areas that have a "need to know" are notified of the train's schedule, Sturgeon said.

In addition to the movement of trains, Coin is used for administrative messages relating to weather or other internal information. And the system can handle car tracing inquiries when a remote office wants to inquire about the current location of a particular freight shipment or railroad car.

The Coin system uses Sangamo data sets on the 2780s and Lenkurt 25As on the 1050s and TTYs. Either of the 3705s can operate with the 155 that is on-line by correctly setting the IBM 2914 channel switch installed between the 370s and the front ends. Only one 155 operates Coin with the second mainframe used as a spare. Each 370 has 1M byte of storage and the site has eight spindles of 3330 disks on-line.

### Before Tcam

Before developing the present Coin system, Union Pacific had 360/65 CPUs which were running under Qtam with 2314 disk storage. One consequence of the shift to Tcam is that it took up about 100K more of main storage than the earlier Qtam system, according to Sturgeon.

The Coin software was developed in-house and the job is not yet finished. The next phase will include software that will allow the collection of revenue data from remote sites. This type of revenue data is not yet operating on the system.

Nevertheless, Coin is handling about 40M characters of data per day and the number of messages is growing.

Many of Coin's features are tailored specifically to railroad operations, Sturgeon said. A system like Coin was not available elsewhere and the Union Pacific staff spent more than a year in developing the Tcam software, he said.

# Terminals Compatible With TSO Include Teleprinters and CRTs

By Kenneth Seidel
Special to Computerworld

## Analysis

In the belief that many OS/360 installations will begin to use IBM's TSO over the next several months, I offer an assessment of different terminals with which I have come in contact, with a simple reminder that these judgments are subjective and limited to those terminals actually available at a particular user's site.

These terminals are (a) IBM 2741; (b) GE Terminet; (c) ITT Asciscope; (d) Control Data 713; and (e) Hazeltine 2000.

Terminals (a) and (b) are printer-type terminals. The Terminet is faster (30 char./sec vs 15 char./sec), quieter and feeds paper more reliably. Also, the 2741 is subject to many more "typing" errors and output errors on data transmitted from the computer.

This is apparently due to the highly mechanical nature of the 2741's printing element, which is required to undergo rapid changes in positions.

The Terminet keyboard is not locked after each command is entered. One can enter a TSO command while waiting for completion of the one entered previously, since the command is placed in a buffer. This is a very advantageous to the experienced TSO user. Only terminal (a), of these five, lacks this buffering feature. However, this feature is optional on the 2741.

The Terminet model evaluated included horizontal tabbing and pin-fed paper features. In voicing rather strong dislike of the 2741, I suggest that if its slower speed doesn't get you, the noise of its Selectric printer probably will. In these days of consciousness of noise pollution and the adverse effects of high noise levels on human hearing ability, it seems important to point out these drawbacks of the 2741 as a heavily used time-sharing terminal.

| Terminal | Type | Character Rate | Rent/Mo |
|---|---|---|---|
| IBM 2741 | Printing | 15 char./sec | $100.50 |
| Terminet KSR | Printing | 30 char./sec | 118 |
| *ITT Asciscope | Display | 30 char./sec | 65 |
| CDC 713 | Display | 30 char./sec | 75 |
| Hazeltine 2000 | Display | 30 char./sec | 88 |

All except 2741 are TTY-compatible.
* Has built-in coupler

Comparison of terminals with costs given for one-year leases with maintenance.

Terminals (c), (d) and (e) are the video display type, evaluated without printer attachments. Both the CDC 713 and Hazeltine 2000 are excellent.

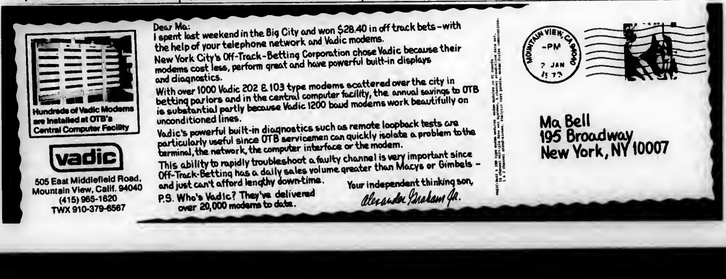
Specific drawbacks of the Asciscope are:

- Small screen depth – only 12 lines.
- Noticeable distortion of displayed characters.
- Poor keyboard contact action, with frequent loss of characters typed in.
- Bad location of cursor movement keys – below bottom alphabetic row, left of the space bar.

Of the two larger video terminals, the Hazeltine's screen has the advantage in number of lines, 27 to 16. Line width maximum is 80 for the CDC 713, 74 for the Hazeltine 2000. Both terminals provide excellent video quality.

The keyboard of the Hazeltine terminal is separate, unlike that of the 713, which is altogether a more massive device. (Either terminal may have an optional printer; in the case of the 713, up to seven terminals may share the printer, making it possible to lower the total number of printers required per video terminal.)

*Kenneth Seidel is an independent consultant.*


Hundreds of Vadic Modems are Installed at OTB's Central Computer Facility

vadic

505 East Middlefield Road,
Mountain View, Calif. 94040
(415) 965-1620
TWX 910-379-6567

Dear Ma:
I spent last weekend in the Big City and won $28.40 in off track bets – with the help of your telephone network and Vadic modems.
New York City's Off-Track-Betting Corporation chose Vadic because their modems cost less, perform great and have powerful built-in displays and diagnostics.
With over 1000 Vadic 202 & 103 type modems scattered over the city in betting parlors and in the central computer facility, the annual savings to OTB is substantial partly because Vadic 1200 baud modems work beautifully on unconditioned lines.
Vadic's powerful built-in diagnostics such as remote loopback tests are particularly useful since OTB servicemen can quickly isolate a problem to the terminal, the network, the computer interface or the modem.
This ability to rapidly troubleshoot a faulty channel is very important since Off-Track-Betting has a daily sales volume greater than Macys or Gimbels – and just can't afford lengthy down-time.

Your independent thinking son,
Alexander Graham Jr.

P.S. Who's Vadic? They've delivered over 20,000 modems to date.

MOUNTAIN VIEW, CA 94040
-PM
7 JAN
1973

Ma Bell
195 Broadway
New York, NY 10007

## *But Carriers Still 'Favored'*

# Montgomery Ward Benefits From Non-Carrier Modems

By Ronald A. Frank
Of the CW Staff

WASHINGTON, D.C. – The use of non-carrier data sets can help save a company as much as $187,000 per remote data center, according to one of the largest users with interconnection experience.

Detailed figures associated with the interconnection of non-carrier equipment were presented by Clinton D. Warkow, corporate communications manager for Montgomery Ward to a Senate Judiciary Subcommittee on Antitrust and Monopoly [CW, August 15]. The firm operates a nationwide communications network.

The company first explored the use of non-carrier equipment in late 1970 in preparation for a move into remote data processing, Warkow said. The remote installstions needed a data set that operated at a speed great enough to drive a 600 line/min printer.

The firm is currently using 9,600 bit/sec modems from a non-carrier supplier. Before this selection was made, a Bell 203 data set operating at 10.8 kbit/sec was tested, Warkow said. But "the common carrier could not get the 203 sets to transmit effectively at that time," the user said.

"Our experience to date has been that the common carrier continuously claims they do not guarantee transmission at 9,600 bit/sec," he said. But Montgomery Ward can usually transmit at this speed with non-carrier data sets if the phone line is brought up to C2 conditioning requirements, Warkow told the subcommittee.

Because Montgomery Ward retained the non-carrier 9,600 bit/sec data sets for more than two years, the supplier applied a 14% discount to the monthly rental rate, making the units available for $137.60/mo. A later reduction brought the data sets down to $85/mo, Warkow said.

In describing the general benefits of dealing with non-carrier suppliers, Warkow said there "is a strong willingness by most . . . to modify their offerings to fit the demands of the user."

The data set supplier has been able to quote prices for equipment which are applicable nationwide compared with various Bell and non-Bell phone companies which can have differing rates, the user said. "This allows us to quote the same price for the same item" to all users within the corporate data network, he said. Delivery of data sets has also been coordinated on a national basis.

The resulting "national network knowledge" on the part of the non-carrier supplier has meant a greater degree of maintenance assistance, he said. He attributed this to an overall understanding of the Montgomery Ward system on the part of the supplier.

Some disadvantages do exist for the user of customer-provided equipment, Warkow said. He pointed out that for some suppliers maintenance was "still an unproven commodity" although he said data modem firms had a better record than suppliers of voice equipment.

Current uncertainty about state tariffs regulating the non-carrier suppliers has been a problem for the company and it might have moved ahead faster if this uncertainty were removed, the user implied.

Despite the advantages of non-carrier equipment, Warkow said the common carriers provide some "very necessary services." The carriers still maintain a "favored" vendor position with Montgomery Ward due to good service over a long period of time. But the agreements with local carriers are "thirty day lease arrangements" while commitments for computer equipment are usually made for longer periods, he said. The pressure remains on the common carrier to control his rates charged to users, he added.

The savings of $187,000 at each data center was based on the non-carrier data sets together with the removal of a medium size CPU. The processor was replaced by a minicomputer and a printer which gave the firm remote data processing ability, he said. The total savings at six data centers was $1,026,600/yr, Warkow said.

In comparing current prices of other carrier and non-carrier data sets, the user said 7,200 bit/sec modems are available at $145/mo "plus maintenance" from non-carrier suppliers compared to $200/mo with maintenance from the phone company.

At 4,800 bit/sec the rates were $160/mo "a year and a half" before common carrier equivalents were introduced in 1970 at $200/mo, Warkow told the senators.

## Novation Has PC Card Modam

TARZANA, Calif. – Novation has introduced a single PC card modem with Bell 103 compatibility.

The A-103 will operate at up to 330 bit/sec, and can be connected to a Bell CBS DAA.

The Model A-103 PC card modem costs $200 in OEM quantities. Delivery is 45 days from 18664 Oxnard St., 91356.

"I got it from Edutronics"

"EDUTRONICS gave us the ability to integrate films into existing courses, create new curriculums . . . and provide low-cost/high-quality education."

**Barbara A. Jones**
**Assistant Vice President**
**BANKERS TRUST COMPANY**

BANKERS TRUST COMPANY, New York City, trains more than 200 data processing personnel annually. Because of widely differing topics and skill levels, effective individual education presented some tough problems. Bankers Trust also needed a system that let people learn at their own speed and convenience. But one that *taught*.

They looked into the EDUTRONICS TOTAL SYSTEMS APPROACH . . . more than 300 lessons with messages people don't forget. They're grouped into modular courses of color films, video tapes, workbooks and study guides. They cover everything from fundamental computer concepts to sophisticated techniques and applications such as our new Virtual Storage course for advanced programmers. The result is something for everyone, regardless of specialization, corporate position, or economic justification.

Just call one of our nearby offices to find out more about the TOTAL SYSTEMS APPROACH. You can only get it from EDUTRONICS.

**Edutronics**
**systems international, inc.**
Lakeside Office Park, Wakefield, Mass. 01880
(617) 246-0914

**Boston**
(617) 245-6980
**Chicago**
(312) 767-1722
**Dallas**
(214) 233-9166
**Kansas City**
(816) 756-0400
**Los Angeles**
(213) 380-7811
**New York**
(212) 421-4610
**San Francisco**
(415) 989-0417
**Toronto**
(416) 484-1992
**Washington, D.C.**
(202) 223-2614
**Winnipeg**
(204) 786-1434
also in London and Paris

*A Subsidiary of Coleman American Companies, Inc.*

**IBM 370's**
**are leased to save money.**

CSA leases provide long term economy, while customers enjoy the flexibility of upgrading and early termination.

For further information, please call (617) 482-4671
**Computer Systems of America, Inc.**
a computer equipment leasing company
79 Milk Street Boston Mass 02109

Send for the 12 questions you should ask of any leasing company before you lease

Name__________
Title__________
Company__________
Address__________
City__________
State__________ Zip_____
370 on order ☐ installed ☐
Model_____ Due Date_____

## Bits & Pieces

### IBM 5440-Compatible Disks Offered at Reduced Price

SANTA CLARA, Calif. – In an "introductory offer," Memorex is selling an IBM-compatible disk cartridge for 5440-type drives at $110 each.

This compares with the standard IBM price of $175 for the System/3 disk.

The Memorex Mark III T is available from the firm at San Tomas and Central Expressway, 95052.

### Do Your Own Testing

LOS GATOS, Calif. – For $59, users can obtain a miniature hardware testing instrument that can be used for servicing and trouble shooting systems without the need for an oscilloscope, according to the developer, Digi-Tronix.

The Model HS 50A Logic Probe can be used to indicate logic "1" and logic "0"; show symmetry/non-symmetry of pulse patterns; indicate presence of pulse trains to 25 mHz and detect and identify polarity of pulses to 20 nsec.

The firm is located at P.O. Box 1699-G, 95030.

### Mini Meets IBM 3740

SANTA ANA, Calif. – Users can marry a minicomputer to IBM's 3740 Data Entry System with a floppy disk storage system from Standard Logic Systems, Inc.

The random access subsystem can incorporate up to four IBM media compatible drives. There are 77 track/drive and track-to-track access time of 10 msec. Each track holds 41K bits for a total of 3.1M bits of storage per drive.

Transfer rate is 250 kbit/sec and an 83 msec average latency time.

Price for a single drive system is $3,950 from the firm at 2215 South Standard Ave., 92707.

### S/3 Memory at 30% Off

ANAHEIM, Calif. – System/3 users can obtain a semiconductor add-on memory (up to 64K bytes) at savings up to 30% over similar memories from IBM, according to CFI Memories, Inc.

The CFI memory is fully IBM-compatible and comes in increments of 8K bytes so it can be used either as a replacement or expansion memory above the basic 8K bytes, the firm noted.

Operating specifications between the CFI memory and standard IBM memory are said to be identical. The firm is at 305 Crescent Way, 92801.

### Recorder Price Reduced

LANSDALE, Pa. – The ICE Pulse Transient Recorder, Model PTR 9200, formerly priced at $9,850 each is now priced at $9,300 from Inter-Computer Electronics Inc., P.O. Box 507, 19446.

### Keep Noise Down

# Printers Speed Motor Vehicles System

By Michael Weinstein
Of the CW Staff

SACRAMENTO, Calif. – Slow printing devices in an on-line inquiry system at the California Department of Motor Vehicles (DMV) recently threatened to grind the entire system to a halt, according to Margery Lucy, acting cbief of the division of EDP service.

Presently, the DMV maintains records for 12.6 million drivers and 15 million vehicles. Both figures have been increasing at a rate of approximately 300,000 per year. The mass of information had reached the point wbere just getting information in and out of the department's computers was a major problem, Lucy said.

This central system includes one RCA Spectra 70 Model 45 processor, one RCA 6 system and two Spectra 70 Model 55 computers. These machines handle all data communications, batch work, real-time inquiry and update processing for DMV files.

To and from this central complex come requests from the many local state offices for information on a specified driver or vehicle.

A typical request, Lucy related, might be an inquiry from the Los Angeles office for an individual's driving record. The communications processor would receive the inquiry and transmit it to the proper data base computer for further processing. When the requested record had been assembled, it would be returned to the communications computer for transmission back to the requesting office where a hard-copy printing device displayed the output.

The main problem was with the hard-copy printing units at the requesting offices, Lucy said. They were too slow and too noisy, she added.

From the operational standpoint, this meant a multimillion dollar computer system was always slowing down to wait for the printers. From the human side, in addition to the frustration of waiting, the constant noise of banging print hammers was creating a fatigue problem. Employees were not able to concentrate on the tasks to which they had been assigned, she said.

Following a study to determine viable options, a Request for Proposal (RFP) was sent to 38 manufacturers. It specified two basic objectives: speed and quietness. Other specifications included a minimum print line of 72 characters, 30 char./sec operating speed, operator accessibility to paper at the front of the machine, visual access to the last line printed, horizontal spacing of 10 char./in., and vertical spacing of 6 line/in.

The proposal was limited to currently available commercially advertised equipment only; specially designed equipment was not allowed, Finally, Lucy said, the investigation covered non-impact as well as impact printers.

GE received the contract award to supply the DMV with 16 Terminet 300 teleprinters. These devices replaced 26 older printers. Further, Lucy noted, production from each printing station increased by almost 80%.

According to Frank Dias, supervisor, central inquiry unit, his group uses its eight terminals constantly from 8 a.m. to 1 a.m. the following morning with almost no interruption.

With these eight Terminet devices and two older units, central inquiry processes 15,000 items a day or about 3 million a year, he noted.

Each printing unit produces about 900 records per shift with each record containing approximately 9 lines of print spaced over five inches of paper, Dias commented.

Finally a side benefit has been a noise reduction with improvement marked enough to remove glass partitions originally installed for noise abatement, Lucy said.

# Used Peripherals Are Good Buys But Users Advised to Stay Alert

Buying used tape and disk subsystems can reduce equipment costs by up to 40%, according to Frank Jeckell, systems analyst at the Union County Technical Institute (New Jersey).

"But to take advantage of good deals," Jeckell added, "users must spend the extra effort to keep aware of current prices and offerings."

"There is no structure to the used computer equipment market," agreed Les Laatsch, assistant manager of data processing at North Western Mutual Life Insurance Co., Milwaukee, Wis.

To keep abreast of current prices and offerings, Laatsch sets aside a small portion of each week to read the data processing classified ads.

"It is not so much that I am looking for any specific piece of equipment," he explained, "but rather that over a period of time I can get a fairly good idea of various selling prices."

Also, as the used equipment market is unstructured, once in a while a user can find an exceptionally good bargain. For example, a particular used equipment vendor might come into possession of a large number of one type of subsystem. Since this vendor does not want to carry the inventory costs of keeping the equipment, he offers it for sale at greater savings, Laatsch noted.

If there were some way to bypass the middle vendors, buying used equipment would be even more attractive, "but presently I can see no way of avoiding the vendors," Jeckell said.

"The secret is contacts," he said. "If you knew what users wanted to sell what equipment it would be possible to deal directly on a user to user basis."

One possible way to effect this user to user meeting would be for one of the associations to provide the marketplace, suggested Laatsch.

"But even this might be difficult," he added, "as the prices are always changing due to supply and demand, and unless the selling user knows the current supply portion of the equation he would be hard pressed to set a price on his equipment."

### Why Worry?

Another advantage of buying used equipment, Jeckell noted, is that the new equipment buyer is always worried about model changes and enhancements. While the newer models are faster and larger, if an older model will perform the specified task, there is little worry that the original vendor will redesign the subsystem, he said.

Both Jeckell and Laatscb advised users who are thinking of purchasing used equipment to demand a good maintenance agreement.

"Normally, users can get equipment that continues to be maintained under the original maintenance agreement," Laatsch said.

The tax advantage of new equipment was downplayed by both Jeckell and Laatsch who felt on financial criteria alone the savings in purchase price more than offset any tax advantage.

### More the Merrier

Another area of agreement was the more who entered the used market the better for everyone. "It is better for the new equipment buyer as he knows there will be a market for his peripherals when he wishes to sell them and it will be better for the used buyer, for as more equipment is put on the market, buying equipment will change from its past history as a wheeling and dealing market," Jeckell said.

In his weekly readings of the classified sections, Laatsch noted a more structured market gaining a foothold and views this trend with mixed emotions.

"On one hand, as the used equipment market solidifies, great individual bargains may become more infrequent, but on the other hand, a large supply means better availability, better service arrangements and overall lower costs for everyone," he said.

uniscope 100:
now interfaced with all
centronics printers!

CENTRONICS
centronics data computer corp
[illegible]
[illegible]

# Study Builds Personality Profile of System/3 User

**By Dave Ferguson**
**Special to Computerworld**

Who is the System/3 user . . . really?

We can't exactly say that tomes have been written on the make-up of a typical System/3 installation, but we do know that it has been the subject of an incredible amount of conjecture.

About four months ago, we received a communication from a graduate student in the College of Business Administration of Pennsylvania State University who was in the process of preparing a thesis on "Minicomputers: State-of-the-Art and a Study of Software Satisfaction."

Group/3 made its System/3 site lists and other facilities available to him for this study. And the results in the area of the typical System/3 site are rather interesting.

As far as the size of company using the System/3, the figures show that the average size company is somewhat larger than had previously been thought. Forty-four percent are below $5 million in annual sales and 60% below $10 million.

The average, however, even when two respondents with annual sales of $1.5 billion and $328 million were discarded, was $12 million. Discarding a couple of $100 million companies would bring that figure down below $10 million.

In terms of years of computer experience by the company, 60% had less than three years although the average was pulled up to 3.5 years by a few old timers who had been in the business over ten years. This is further borne out by the fact that, in 60% of the sites, the System/3 was the company's first computer and in 91% of the sites it was either their first or second.

***Ferguson On System/3***

Peripheral and software manufacturers seem to have had a tough time believing that the market was composed of such a high percentage of first-time computer users. Even though the sample size of the survey was fairly small (500) and the number of respondents naturally smaller (101), the universe is large enough to insure a fairly good statistical sample.

In terms of the number of computers within an installation, 92% of the respondents answered with a resounding "one!" And the average is only 1.1. The small size of the sample might have a negative affect in this area, however, because there may be a significant chance that the survey missed most or all of the companies which maintain multiple sites. Bergen-Brunswig, Squib, Pfizer, U.S. Home, Caltex and Owens Illinois have over a 100 System/3s among them.

The figures do tell us, however, that this is far and away a one-computer-per-installation market.

### How Many Programmers

The number of programmers employed within an installation is also interesting. Sixty-five percent of the sites had less than two programmers and 93% less than three. The average is 1.4.

However, there seems to be a dichotomy here when one looks at the part of the study dealing with software. The figures show that 60.2% of installation programs were written *in-house!* Those 1.4 programmers are either wizards or work 24 hours a day, seven days a week with no time off for good behavior.

Another fact that caused us to raise a critical eyebrow was the fact that these S/3 programmers had also written two assemblers, a Cobol compiler and 21 RPG compilers. This is the kind of expertise we would not have expected to find within a typical System/3 installation to say nothing of the fact that the economies of the situation would absolutely preclude any such development.

Quite frankly, we feel these figures are very suspect. This is especially true in light of the fact that the number of these complicated programs claimed to have been written in-house was rather high.

### Independents Take Heart

The fact that these installations bought 76 application packages from IBM while they purchased 26 from independents is a good sign for the independent software companies. IBM easily offers over ten times as much software as all the independents put together. This seems to bear out our earlier contention that System/3 users are not as locked into IBM as other IBM users are.

As far as the basic goal of the survey was concerned, "software satisfaction," nothing of an astounding nature was revealed. People seem to be more satisfied with software created in-house than when purchased from IBM or an independent. This can be easily explained from the point of view that the person filling out the questionnaire usually had something to do with making the decision to do it in-house in the first place. And, of course, there's the "not invented here" factor.

### IBM, Naturally

IBM, by the way, scored significantly higher in the area of program creation packages than in application programs which, again, would only be natural.

This survey is not going to lay all the conjectures to rest, but it is somewhat comforting to note that even our universities are beginning to take notice of the idiosyncrasies of the System/3 marketplace.

*Ferguson is president of Group/3.*

Minicomputer SOFTWARE

Here's an exciting new operating system with RPG that dramatically simplifies and speeds data processing applications

**CIMOS-22** is a disk-based operating system for the CIP/2200 minicomputers which consists of language processors, programming and debugging aids and services that simplify data processing applications. The capabilities of CIMOS-22 are packaged in a flexible system design so that each user can tailor the operating system to his individual needs. From either RPG or assembly language programs, the user can take advantage of the high-level data management facilities of CIMOS-22. These facilities include the ability to organize, catalog, store, retrieve and update data files. From a system console or assembler language program the user can create and delete disk-based files. On-line editing capability permits the user to build and maintain data files as well as source and object program libraries. There is much more to CIMOS-22 that you should know about. It's all detailed in our new brochure shown here . . ., and it's yours free. Cincinnati Milacron, Process Controls Division, Lebanon, Ohio 45036.

FREE

minicomputers
CINCINNATI MILACRON
Machine Tools
Process Controls
Chemicals
Plastics
Plastics Processing Machinery
Abrasives

Cincinnati area (513) 494-5444 • Chicago area (312) 439-5726 • Los Angeles area (213) 582-8361 • Detroit area (313) 557-2700
New York area (201) 887-4800 • Houston area (713) 622-4620 • San Francisco area (408) 735-0701 • Atlanta area (404) 634-6312

COMPUTERWORLD

CW SPECIAL REPORT

# ★ More Storage for Your Buck ★

## Prepare for the Data Explosion

**An attendee at a recent computer conference remarked that as the years passed, memories and disk systems have gotten larger and larger; but during the same period of time he had found it increasingly difficult to remember all the things he could when younger. This correlation led him to believe the total amount of memory in the universe at any one time is a constant.**

**Whether or not his observation is truly a physical law, we certainly are involved in a data explosion of Malthusian proportions. The new trend is to keep on-line records of every possible event or transaction. Further, we are entering an era of networking with large computers sending information across the phone lines resulting in the storage of data in multiple locations.**

**A defendable forecast is that over the next several years the amount of storage needed in typical systems will increase faster than any other system component.**

**The job of the user is to make sure the computer's data diet is digestible. This special report looks at ways users can get the most for their money, while making sure their systems don't bite off more than they can chew.**

# Storage Performance Depends on Two Factors

## • *Use of Mass Configuration*

## • *Physical Limitations of Hardware*

PHOENIX – A frequent problem faced by users is determining the best operating configuration for direct access subsystems, according to M.A. Diethelm, principal engineer, Honeywell Information Systems.

As disks and drums are generally slower than either main memory or the central processor, intelligent usage of these media can contribute markedly to the overall system performance.

Storage system performance is dependent on two paramcters, Diethelm said, the use of the mass storage configuration and the physical limitations of the hardware devices.

Therefore, the first parameter (usage characteristics) must be measured before the total storage system performance can be estimated. The determination of storage use can be accomplished by considering the mass storage space as a collection of files of which some are permanent and some are temporary or dynamic (or scratch), Diethelm suggested.

This definition allows users to build a model of system usage consisting of each file listed with its known amount of I/O activity.

### Locating Individual Files

The next step in predicting the system performance is to use this information to decide where individual files should be located in the existing system, or to perform simulations of proposed systems. The object is to maximize system performance by making the most-used files easiest and fastest to access, he said.

While this operation is not extremely complex, it does require the user to take measurements of the activity of the existing or proposed storage configurations.

These measurements can be obtained using either hardware or software monitoring techniques.

Hardware monitoring has the advantage of being non-interfering; that is, it adds no confusion to normal system operation during the measurement period, Diethelm commented.

But, he added, a severe disadvantage to the application of hardware monitoring is the elaborate and expensive equipment required to obtain the information on frequency of reference to addressable, specified portions of the mass storage.

### Software More Flexible

A more flexible method of gatherihg the required information is through a software monitor. While this method does create some disturbances in normal operations, it has the advantage of capturing data which can be analyzed after the fact, he stressed.

By way of illustrating the software technique, Diethelm outlined the use of a software monitor designed for use with Honeywell's GCOS operating system.

This privileged software obtains control at the time of initiation of any I/O command to gather measurement information to be used later in analysis. This information includes:

- Job characteristics
- Job and activity identification
- File identification of the file being referenced
- CPU time used for the job
- Physicai I/O characteristics
- Subsystem, channel and device identification
- I/O command(s) issued
- Seek address
- Data transfer size

This information is processed by a separate program to produce a histogram of device and file space accesses, seek movement distances, device utilization and a cross reference listing of files accessed by job activities.

Having a set of mass storage files defined as well as a measured profile of the frequency of access to each, the next step is to postulate an allocation of these files to the mass storage subsystems.

In general the problem is to choose a subset of files which will fit the designated fast I/O device.

It is at this point that the user has the needed information to begin an evaluation of cost and efficiency of changing configurations.

The factors to be considered are whether the resultant speed of faster I/O devices (e.g., replacing disks with drums) is beneficial enough to offset the added cost of these devices.

The cost portion is basically a comparison of the cost of new hardware and system utilization cost at the higher speed versus the cost of the older, slower mass storage devices coupled with their system utilization charges.

Of course, this is a somewhat simplified view, Diethelm noted, as other factors may work to add new parameters to the decision such as if the user adds faster I/O, he may free some processing power for other tasks and avoid an upgrade.

On the other hand, if the system is underutilized and speed is not the primary consideration, faster devices may not be needed.

In any case it is up to the user to use the scientific evaluation techniques to gather his data, but from then on he must determine his own unique requirements as to how to get the most from his system at the least cost, Diethelm concluded.

# Channel Keeps Data Flowing Smoothly

> *"The channel is the traffic cop – stopping and starting traffic – on a demand basis and ensuring that no collisions occur."*

**By Tom Knight**

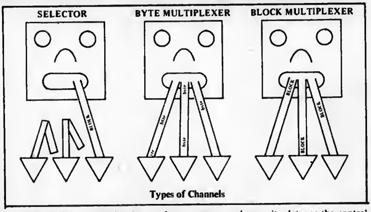
Special to Computerworld

A channel is a computer. It has its own memory and logic just like a central processor.

It is different from the CPU in that it performs a different function: coordinating the flow of information into and out of the central processor's main memory. This flow is said to take place over a data path or through a port in the CPU.

Users can think of the channel's data path as a two-way street that's wide enough for cars to travel in one direction at a time. The channel is the traffic cop – stopping and starting traffic on the street on a demand basis and ensuring that no collisions occur.

Once orders or commands from the CPU are understood, the channel does what it is told without tying up the central processor further. When the task is completed, the channel signals the CPU through a signal called an interrupt that the specified I/O operation is complete. The signal is called an interrupt because it interrupts whatever the computer is doing for a time.



Types of Channels

Channels connect to control units, some of which are in a box by themselves, and some in the same box as the I/O device. But regardless of where it is located, the controller function is the same: to control the locating, reading and writing of data on one or more I/O devices. When there is more than one I/O device attached to a controller, this function also includes making sure the right data gets to and from the right device.

The I/O devices – tape drives, disk drives, printers – follow the directions they receive from the controllers. They move access arms, select heads, move paper, read or write data, as the control unit dictates.

The division of the I/O function into three separate functions – channel, controller and device – is arbitrary and dictated by IBM policy. On all 360 systems, IBM created a standard interface between all channels and all control units. It is this interface, or plug, that allowed compatible peripherals to be attached to IBM's CPUs.

### Two Channel Types

IBM originally divided channels into two types: selector channels and multiplexer channels – now called byte multiplexer channels to differentiate them from block multiplexer channels.

*(Continued on Page 18)*

## On the Inside This Week

**RPS Saves Read/Write Time on Block Multiplex Device . . . . .Page 18**
**Star 100 Takes Modular Approach to Virtual Storage . . . . . .Page 19**
**Floppy Disk Ready to Join Other Standard Media . . . . . . . . . .Page 22**
**How Much Memory Can a Minicomputer Manage? . . . . . . . . . .Page 22**
**Value of Data Should Determine On-Line Storage . . . . . . . . . .Page 23**

# RPS Saves Read/Write Time On Block Multiplex Device

**By Tom Knight**
Special to Computerworld

Most controllers are like selector channels: they can handle only one request at a time.

If controllers for block multiplex devices, such as disks, had this restriction, in order to make block multiplexing work a controller for each drive would be needed. For this reason, all controllers for block multiplex devices are like multiplex channels and handle more than one request at a time.

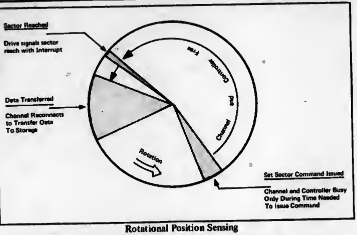
This ability is called multiple requesting. The feature can be thought of as each controller having its own non-shared subchannel for each drive attached to it. An area of the controller is set aside to store information pertinent to an I/O operation. As each device works through a separate storage area all the devices on a controller can operate concurrently.

Rotational Position Sensing (RPS) is the key to making the block multiplex concept work. Rotational delay – the time wasted in disk operations while the device is waiting for the information requested to move to a position where reading or writing can start – is the area in which block multiplexing saves time. RPS allows the device to signal the controller and channel when a block of information is ready to be transmitted, when the disk is about to rotate into a position where it can be read from or written on.

Several block (areas) can be located on a disk track – the area on a single disk surface on which information can be written or ready by a single disk head without head motion. Although a track is a circle, it has a logical beginning and end.

The beginning, which is sensed every rotation by the drive mechanism, is called the index marker. This is the reference point of the track. The location of everything else on the track is expressed relative to the index marker. This is true of all disks.

RPS disks go one step further in defining the layout of the track: it is divided into a specific number of sectors, the first immediately following the index marker. These sectors are used as reference points to locate blocks or areas on the track. It is by sector number that the RPS device knows when a block or area is upcoming on the rotating disk track, and thus, when the controller and channel should be signaled that the device is ready for data transmission.


Sector Reached
Drive signals sector reach with Interrupt
Data Transferred
Channel Reconnects to Transfer Data To Storage
Free
Controller
and
Channel
Rotation
Set Sector Command Issued
Channel and Controller Busy Only During Time Needed To issue Command

Rotational Position Sensing

RPS sectors can be thought of as "pie-shaped" wedges dividing the disk surface into an equal number of parts. It is important to realize that the nuber and size of sectors has no physical connection with the way data is organized on a disk track.

Blocks do not have to begin on sector boundaries or be an equal number of sectors long. For this reason it is sometimes more appropriate to think of sectors as slices of time rather than space, the time being the rotational time of the disk device. The function of the sector is to allow the drive to signal the controller and channel when (not where) the block or open disk area is available.

### Command Retry

Block multiplexing was divided in order to increase throughput – to save channel and central processor time. While already significantly cleaning up its direct access I/O procedures with RPS, multiple requesting and block multiplexing, IBM decided to go one step further and allow the channel and controller to retry failed I/O operations without notifying the processing unit: I/O recovery routines being implemented in the hardware instead of the software.

Errors involving data checks (unreadable data or parity errors) and overruns (data being read too fast for channel or main storage to accept) are thus handled by command retry.

This allows the block multiplex channel and associated multiplex controller and devices to handle soft (intermittent) data recovery problems. The CPU is interrupted with an error only if it is determined the error is uncorrectable.

IBM provides two controller/drive sub-

*(Continued on Page 19)*

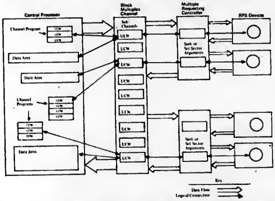


Figure 1. Block Multiplex Channel Operation

# Channel Keeps Data Traffic Flowing Smoothly

*(Continued from Page 17)*

Selector channels are logically and physically active with only one device at a time, while the multiplexer channels are logically connected to several devices simultaneously and become physically connected to a specific device only while that device is actually transmitting or receiving data.

Typically, selector channels are used with high-speed devices; the reason being that since the channel locks on to only one device at a time, locking on for a short time to a high-speed device to transmit a large amount of data is more efficient.

Multiplexer channels are usually used with low-speed devices, because a single high-speed channel can coordinate the activities of several low-speed devices. This is accomplished by accepting one byte at a time from each of the simultaneously operating devices. In this instance, the controller takes on the added function of signaling the channel when another byte is ready for transmission.

A selector channel is said to operate in burst mode – the high-speed transmission of large bursts of data. The multiplex channel normally operates in multiplex mode; however, when high-speed devices are attached, a multiplex channel is forced to operate in burst mode. While in burst mode all devices other than the transmitting unit are locked out.

Multiplex channel operation is much more complex than selector operation as the multiplex channel must handle several requests at a time, while the selector handles only one. This means multiplex channels must have storage and logic to handle several operations concurrently.

The storage area in a channel used to hold an I/O command is called a subchannel. A selector channel can be defined as a channel with only one subchannel. The term multiplex implies at least two subchannels.

A block multiplex channel accepts blocks of data (instead of bytes) and has subchannels, the number of which determines the number of simultaneous operations that can take place.

Because block multiplex channels can handle high-speed devices, it is sometimes appropriate to use them as selector channels (most of the 370 line has only one kind of high-speed channel, a block multiplex). This is done by assigning a subchannel to a selector-type operation. Thus, the single selected subchannel acts as if it were a stand-alone selector channel.

Just like a selector channel, several high-speed devices can be attached to this single subchannel. For this reason, such a subchannel is called a shared subchannel.

Each device on a multiplex channel (block or byte) capable of multiplex operations must have its own subchannel – its own area where command information can be stored. This type of subchannel is called a non-shared subchannel, because it is assigned to a specific device and no other device can use it.

Block multiplex channels normally have only one shared subchannel as increasing the number of shared subchannels would not result in any increase in throughput, as only one of the subchannels could be active at any given time.

A byte multiplex channel is capable of interleaving the bytes transmitted by several low-speed devices because the channel is several times faster than only one of the devices. This is not true of the block multiplex channel as the data rates of the devices being multiplexed on a block multiplex channel are as high as that of the channel; therefore, only one device at a time can be transmitting data through the channel.

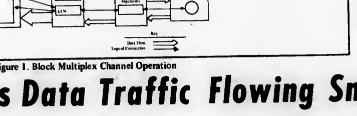
The block multiplex channel was developed to handle high-speed direct access storage devices – in particular, high-speed disks. Operation of such devices on a selector type channel is inefficient, because more channel time is spent waiting for information to become available for transmission than is spent in actually transmitting data.

The block multiplex channel, plus special features in the disk devices, allows multiplexing to occur such that the devices are attached to the channel only during the time data is actually being transmitted. Thus, several devices can concurrently be positioning themselves while one device is actually sending a block of data.

Block multiplexing is as much a function of the I/O control unit and device as it is a function of the channel. Tapes, for example, cannot be multiplexed. Compared to block multiplex devices, tapes are slow and there is little wasted time in standard selector channel operations.

The controllers and devices used in block multiplexing are capable of special modes of operation not available on other devices: multiple requesting in the controller and rotational position sensing in the drives.

*Tom Knight is systems engineering manager for Computer Investors Group.*



IBM Standard Input/Output Architecture

## Separate Stations Control Paging

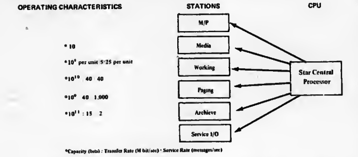
# Star 100 Takes Modular Approach to Virtual Storage

MINNEAPOLIS, Minn. – A crucial factor in the efficiency of a virtual memory computer is the speed at which the system can page information into and out of main memory.

The standard IBM approach is to control paging operations from the central processor. The Control Data Star 100 takes a different approach and is designed with "stations" physically separated from the main computer which control the paging operations.

This modularizes the total computing function into independent asynchronous tasks which operate in parallel with the CPU and results in faster paging rates than possible under a one system control plan, according to W.C. Hohn, senior design engineer at CDC.

A side benefit, Hohn stated, is that the modular approach simplifies central processor design and provides a means to control larger numbers of storage devices and terminals.



*Capacity (bits) : Transfer Rate (M bit/sec) · Service Rate (messages/sec)

**The Star-100 System is arranged so it can perform 17 transfers/drum revolution where previous systems were able to perform only one transfer/revolution, according to CDC.**

### Computer Unto Itself

Each station is a small computer system in itself, consisting of a Station Control Unit (SCU) and a Station Buffer Unit (SBU). The SCU is a minicomputer with a small drum subsystem and display console. The SBU consists of 64K bytes of core memory and acts as a buffer unit, holding data ready for transmission to the central processor on request.

The M/P station manages maintenance and performance analysis of the mainframe processor.

The media, working and paging stations consist of tapes and disk packs, large disk and drums respectively.

Each user has four keys, Hohn said, which reside in the program's control package and provide four levels of access protection in virtual memory.

### Global Page Table

There is one global page table for all users with one entry for each core page. There are two page sizes: normal (4K bytes) and large (524K bytes).

The page table has 16 associated registers at the top and the rest of the table is core memory. The translate time in the 16 associated registers is one minor cycle (40 nsec).

When a hit is made, that entry jumps to the top of the table. Thus, Hohn noted, most frequently referenced blocks have entries near the top of the table and conversely, the best candidates for removal from memory are at the bottom of the table.

### No Degradation

This paging mechanism acts to give the system a virtual memory capability without degrading system performance (100M results/sec), he added.

When the virtual address is not found in the page table, an access interrupt occurs and control is switched to the monitor. The paging stations contain the overflow pages from main memory.

The paging station consists of two CDC 865 drums and a page table search mechanism, called a comparator, connected to an SBU. The entire station is controlled by an SCU.

### Buffer Space

One half of the 16-page SBU contains the virtual page table and the other half (minus some drum control space) is used as a buffer space for the drum/central page transfers.

In order to ease the SBU memory conflict situation, Hohn added, the SBU memory is hardwired to operate as two independently phased memories with a width of four 16-bit words every 1.1 μsec. In this manner the comparator has sole access to its half of memory and the drums and channels complete in their half, with the drum having top priority.

All hardware interfaces – drums, comparator and channels – are controlled by routines residing in the SCU. The SBU provides a data freeway for page flow from the drum to central memory.

Having the SBU between central memory and drum reduces channel design complexity, Hohn said, by not having it interface to critical, real-time, rotating devices.

Requests for drum transfers are made to the queue program, not to the driver directly. This program translates the drum block address into a head and sector address. If the resulting sector position is free in the associative queue, the request is placed in the queue; otherwise it is placed in retry mode and offered to the queue program periodically until accepted, he noted.

As the number of requests increase, the probability of filling more queue slots increases and raises drum throughput.

### The Comparator

The virtual page table maps the drum(s) one entry per drum block. Each 64-bit entry contains a unique drum block address and is flagged as either free or attached to a virtual address.

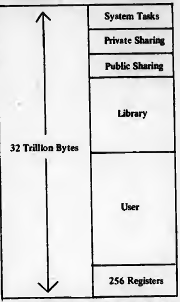
The comparator is a hardware unit which compares selected virtual addresses against the page table entries. All entries move down as the search passes them unless a match is made. The entry that matches is placed in a now vacant slot at the top of the list, thereby generating in time a list topped by the most active entry and arranged thereafter in order of descending activity.

This form of page table maximizes performance, Hohn said, because the table is both compressed (all active entries at the top) and ordered by activity, two characteristics which minimize search time.

The table scan rate is one entry every 1.1 μsec or 910K entries/sec.

The paging station (which includes the comparator) is driven by messages from the central processor. Essentially the paging station polls central memory for messages and on finding a group of active messages reads them into the SCU where they are processed.

All code is reentrant and many messages can be processed simultaneously, Hohn noted. The average number of memory cycles needed to process a message such as Read Page is 3,000, he concluded.



**CDC's virtual memory is designed to have most frequently accessed data dynamically located near the top so that search times are reduced.**

---

# RPS Saves Read/Write Time

*(Continued from Page 18)*

systems that support block multiplexing: the 3830/3330 and compatible systems, and the 3835/2305 and compatible systems. Both of these subsystems offer multiple requesting, rotational position sensing and command retry.

Figure 1 illustrates block multiplexing operation RPS devices illustrated is a situation with four devices, two controllers, a channel, and a central processor, with three concurrently active channel programs.

A channel program is a group of instructions that define an I/O request. Several instructions – called channel command words (CCW's) – are needed for a normal direct access device I/O operation because separate commands are needed to specify positioning or selecting a read/write head, setting a sector and the actual reading or writing.

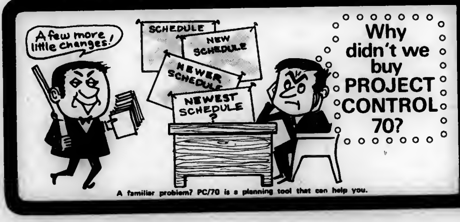
The channel program is in the CPU's main storage. Also in main storage is the area to or from which data is to be transferred. This area is commonly referred to as a data area or data buffer.

When an I/O operation is started (by the CPU) the block multiplex channel assigns a subchannel to handle the request. The subchannel is sometimes also called a unit control word (UCW). The subchannel maintains a logical connection (main storage address) with the channel program it is executing. The subchannel remembers which CCW is currently being executed and where data is coming from or going to in main storage.

The subchannel, in turn, is logically connected with a controller that has multiple requesting capabilities. The multiple requesting controller retains the seek argument or set sector argument (the cylinder/head being sought or the sector being waited for by the drive) in its own storage while the CCWs to seek or set sector are being executed.

The drive executing such commands takes no channel or controller time while seeking or waiting for sectors. In this way, several disk devices can operate concurrently.

*Tom Knight is systems engineering manager for Computer Investors Group.*



A few more little changes!
SCHEDULE
NEW SCHEDULE
NEWER SCHEDULE
NEWEST SCHEDULE
Why didn't we buy PROJECT CONTROL 70?

A familiar problem? PC/70 is a planning tool that can help you.

Contact: Robert P. Wolk, V.P.

**Atlantic Software Inc.**
Lafayette Building, 5th & Chestnut Sts.
Philadelphia, Pa. 19106 • 215-925-8424

☐ Please send us literature about PROJECT CONTROL/70

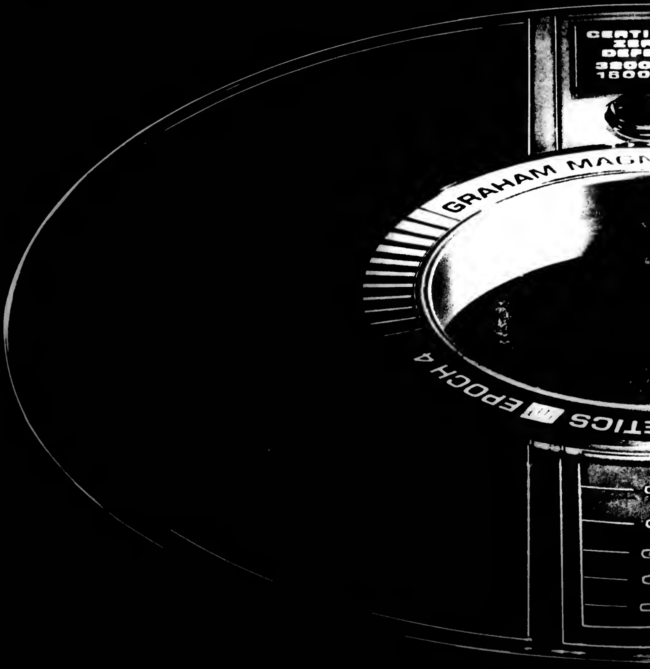
Name ____________
Title ____________
Company ____________
Address ____________
City ________ State ________ Zip ________
Telephone (____) ____________

# 6250 BPI? Epoch 4 is

Epoch 4 was far ahead of its time when Graham Magnetics developed it.

So if you're getting ready to phase in the newest generation of high-speed, high-density drives, you can rest easy as far as computer tape goes.

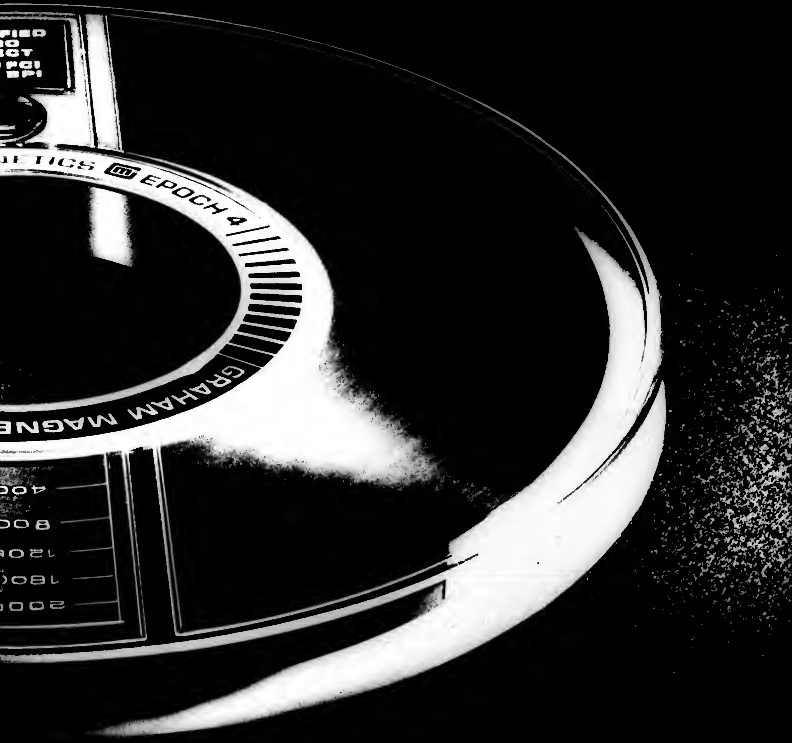
Epoch 4 users are i
because its high therm
face friction and extra
enable it to perform jus
high speed drives as it
6250 BPI? Epoch 4 i

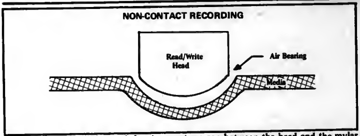


# s ready when you are.

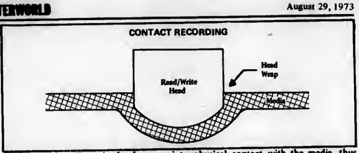
n an enviable position,
al properties, low sur-
-high packing density
t as well at 6250 BPI on
has at 1600 BPI.
s ready when you are.

GRAHAM
MAGNETICS
Graham, Texas 76046





With a flying head disk, an air bearing creates a gap between the head and the mylar media.



In contact recording, the head comes into physical contact with the media, thus causing wear to the mylar surface, reducing the effective life of the floppy disk.

# Floppy Disks Ready to Enter Standard Media Arena

By Robert A. Cantarano

Special to Computerworld

Since mid-1972, there has been a great deal of interest, but as yet limited use of hardware systems incorporating floppy disk technology.

Most of the activity has been by Original Equipment Manufacturers (OEMs) developing turnkey systems. Examples of such systems under development are programmable calculators, power typing, intelligent terminals, word processing, process control and small business systems.

Quite possibly these systems will be announced for delivery in late 1973 or early 1974. Currently several firms are shipping point-of-sale and source data entry systems utilizing floppy disk memory drives.

With the increased application and utilization of floppy disks, many think the floppy disk is about to break out and join other standard media such as tape cassettes and drives and hard disks as a component users can choose to fit their computing needs.

In order to understand which specific needs the floppy disk is best suited to fill, it is useful to see how it was born and how it has been raised to its present point.

During the 1960s many end users worked toward evolving various forms of management information systems characterized by centralized records and files.

At that time, this approach was considered the best available solution for handling large amounts of data coming from various locations.

While the major push was for centralization, a counter group was of the opinion that distributive data bases or decentralization of many records and files was a viable alternative.

> *"[Lower cost] provides a great incentive to produce disk subsystems using floppy techniques that make on-line data storage inexpensive enough for users to follow the decentralized philosophy of data handling."*

Significant among the companies questioning centralized MIS approaches were the minicomputer and miniperipheral companies who felt the technology existed to give users a computer capability other than in the form of a large centralized computer.

But to a large degree, industry norms were set by the equipment and software provided by the larger firms. Thus, users developed attitudes set by large system vendors.

With floppy disks users can usually choose the best of the centralized approach mixed with the best of the decentralized approach to construct a system according to their needs.

Technically, floppy disks were born to serve a program load function in a disk or tape control unit – for example, IBM's 3330. In the beginning, no one thought of using them for other applications.

As other firms built 3330-type replacements they also had to make the floppy disk for their own program loads. In doing this they had to develop the ability to write on the disks.

With this capability in hand, these other firms began to examine other applications for which the floppy disk might be used.

An ideal application for the new technology would be in the development of disk subsystems inexpensive enough to be used in support of satellite processing operations – e.g., to support a remote intelligent terminal, providing data buffering, program storage and the capability to format and preprocess data on the disk. Further, it provides for summary (or whole-file) type of inquiry information at the source.

What the firms had to build upon was a recording media constructed of standard mylar used for magnetic tapes. The difference is the floppy disk mylar tape sheet is cut into a disk, much like a 45 rpm record, and not strips.

The record, track and sector formats are the same as for hard disks, but floppy disk recording media (mylar) is about 1/60th the cost of comparable hard disk recording media (metal).

### Cost Great Incentive

This cost differential provides a great incentive to produce disk subsystems using floppy techniques that make on-line data storage inexpensive enough for users to follow the decentralized philosophy of data building.

But before users could jump aboard the cost-savings bandwagon certain technical areas had to be smoothed out, a process that is still in effect.

Floppy disks had previously been used with the read/write heads in contact with the mylar surfaces during read operations.

This approach was acceptable when the disk was not being used much as in the 3330 program load. But as the disk is used more, frictional problems can result in a form of scouring and contamination: specifically data degradation.

The alternatives to contact heads are either to fly the heads (as in standard disk operation) or to fly the media using air suspension to keep it physically separated from the heads. Most firms are opting for this approach.

Another consideration is the difference between non-contact start/stop and contact start/stop. Under contact start/stop the mylar disk makes contact when the drive is powered up and maintains contact when the drive is powered down. Again this process can lead to friction and resulting problems.

One of the major selling points addressed by IBM in selling its floppy disk-oriented system (contact recording) is the ability to handle and mail floppys from one location to another.

The user's operating environment is a work situation in terms of operator-oriented systems and environmental conditions. There are several factors that could minimize data reliability problems.

(Continued on Page 23)

# How Much Memory Can a Minicomputer Manage?

OCEANPORT, N.J. – How much memory is too much for a minicomputer?

As minicomputers are made with faster internal speeds for the central processor, a user might well ask: Why not buy a minicomputer with a CPU speed faster than an IBM 370/135, give it 256K bytes of memory and have a system which costs about 25% of the IBM system but is faster?

Obviously there is some limit beyond which adding memory is not practical. For example, a 16-bit minicomputer is ill-equipped to handle a 1M-byte memory, according to James Folts of Interdata Corp.

To understand why the conventional mini can't handle 1M bytes of memory and to find an answer to the full question of how much memory is enough, Folts stated, it is important to understand the history of minis and how the past has acted to build in limits on the present models.

The early minicomputers were designed to provide the cheapest possible tool to solve computing problems. In this design, instruction sets were kept small, since to add new instructions would have meant adding the required control logic hardware. In an effort to keep costs down the traditionally small instruction sets are one parameter acting to limit the amount of memory a minicomputer can effectively handle.

The second criterion also comes from the cost conscious days when the number of registers was kept small to keep costs down, he added.

And the third and most stringent restriction is purely mathematical. A 16-bit minicomputer can only address up to 64K bytes of information. Any location beyond this 64K-byte limit requires more than 16 bits to represent its address, he continued.

For simple computing, these limitations are not that important. As applications become more complex, however, the impact of a limited instruction set becomes more marked.

At some point it may take seven or eight instructions using the smaller set to accomplish the same act as one instruction of a larger set. If the standard minicomputer adds additional instructions (as they have), this acts to add to the cost and complexity of the architecture, Folts contended.

There is one way out of the instruction set bind, and that is to use microcoding, Folts said, as increasing instruction sets does not markedly affect machine architecture or cost.

The conventional minicomputer has two or four registers compared with eight or 16 for the medium-scale computer.

The number of registers directly affects the number of operations the computer can perform during a given time period, Folta said. At some point, it is not economical to keep information in main memory if the system must wait for the CPU to catch up.

Microcoding and other hardware or software techniques will not buy the user away from this problem, he said.

The most striking restriction, though, is the 16-bit minicomputer's ability to address only up to 16K bytes. To the user this limitation means that he can only run programs that do not exceed the 64K-byte limit, Folts noted. This is a real restriction as in the case of a Fortran compiler that can take up to 60K bytes if it includes features such as reentrant capabilities or global optimization.

Even if the user gets a stripped down compiler he is limited, Folts said. "For example, a 100 by 150 real array in Fortran would require 60K bytes for the data alone, which would leave 4K bytes available for the rest of the program and compiler."

There are ways to overcome this by using software to map and overlay portions of the larger programs, but this acts to make system operation markedly more complex and much slower, he said.

Every time a mapping operation is needed the program must go through the operating system, he noted.

While the mathematical limit set by the registers in turn sets a limit on the size of programs that can be run effectively, it does not set the limit on the number of 64K-byte programs that could be held in memory simultaneously by a 16-bit minicomputer.

In most cases, added memory is attached via a Memory Segmentation Unit that includes a group of eight base registers. These registers allow the computer to physically address up to 256K bytes.

But operationally for any one program, the limit is still only 64K as that is all the central processor is capable of addressing, Folts said.

When can a minicomputer with extra memory take a job away from a classical medium-scale computer? Only when the inherent restrictions of the instruction set, number of internal registers and addressing capability do not make user applications impossible or impractical, Folts said.

For these users, the cost advantages run from 50% to 75% to perform the same results in the same time as the higher priced mainframes, he added.

How much memory can this box handle?

## Remove Old Information, User Suggests

# Value of Data Should Determine On-Line Storage

BALTIMORE, Md. – One small system user here believes a major storage consideration is the value of the data kept on-line.

"Data has a way of just growing like crab grass if left unchecked," said Ed Neff, DP manager for American Trading and Production Corp. To keep the system healthy and responsive he has developed a system to check the timeliness of data and remove information that is old and useless.

Neff's system is built around an IBM System/3 Model 10 with a 9.8M-byte disk subsystem. Most of the disk space is used for files that relate to individual customers, specific products, accounting information and vendors.

Of these, the most significant in terms of size and use are the customer and product files, Neff said.

Each of these files in turn is broken down into fields. For example, in the customer file, major fields include sales this year, sales last year and open orders (orders which have been received but not filled).

To make sure the company is not paying to keep information on-line that is no longer useful, Neff has written a program (in RPG II) that is used to periodically check the currentness of all files.

### Orders This Year?

In the case of customer files, the program calls in each individual customer file and checks to determine if there have been any entries made in either the sales this year or open order fields.

If an entry had been made in any one of these fields the file is returned to disk unaltered, Neff said.

On the other hand, if no entry had been made, the name of the customer and the file location are written into a temporary file. Then a "d" is written onto the inspected customer file in the field that determines the activity status before the file is returned to the disk.

When all files have been queried, Neff said, the temporary file of all customers who have made no transactions during the previous year is printed out and taken to management for review.

Management reviews the list and advises the computer department if there is any reason why any of the customers listed should not be deleted from on-line status.

This review allows a human interaction that has proved valuable above and beyond the mere computation activity of the computer program, Neff said.

For example, a given customer might be building new stores and has told management that he will soon be increasing his orders. Management can then advise the DP department to keep this customer active, he continued.

> *"Data has a way of just growing like crabgrass if left unchecked."*
> *– Ed Neff*

After the list is signed off by management, the "d" in the selected files (those to be kept on-line by management recommendation) is changed to an active code, Neff said.

For the rest of the "d" files, a program now changes the "d" to an "x." Those customers with an "x" in the status field are left on-line for one more day and if no change is directed a program pulls all files that have the "x" coding and punches their contents onto cards.

The punched cards are kept as a backup record in case the customer reorders at a later date.

### Keeping the Record Straight

One more activity is performed before the contents of an "x"-rated user's file are erased from disk, Neff said.

If the customer did not order this year but did order last year, the amount of his order and the products ordered are moved to a cumulative file. These numbers are the only fields moved, but they permit a determination of total sales by product for the previous year and are useful for comparative studies, Neff said.

With this information vital to the firm still on-line, the program now erases the non-essential information by erasing the "x"-rated user's file.

If that user ever comes back into active status, it is easy to reload his information from the punched card back-up, Neff stated.

---

## Floppy Disks Finding Their Place in I/O

*(Continued from Page 22)*

For example, dust covers and sealing the floppy drive help prevent dust and other contaminants from entering the drive. Also, it is best to have the mylar come in minimal contact with human hands.

Other considerations for the user are compact size, weight, power requirements, one drive motor versus two or more per drive and most importantly cost and reliability.

Without a large user demand at this time, it is impossible to set price ranges except to say that for the OEMs, the several floppy drives minus interface and controller considerations range in price from $500 to $5,000 per drive.

Capacity, or bytes of storage, is a function of the application system. Floppy disks are flexible enough that users can have a system built to almost any requirement – maximum about 1M bytes.

*Cantarano is vice-president of Data Education, Inc., Waltham, Mass.*

## About the Author

This special report was prepared by Michael Weinstein, *Computerworld*'s systems editor.

TAPE CO ADVERTISING MANAGER
FOR THOSE WHO CARE ENOUGH TO STORE THE BEST
TAPES BY

"Well, let's run it up the flagpole and see who drags it down to burn it."

**Jim Crough of Memory Technology...**

**can show you how to save $10,000./$15,000. per month and more with your IBM 370/155 or 370/165**

How? It's simple. Just replace the memory portion of your current computer system by plugging in a semiconductor memory money saver: the MTI-755 or the MTI-765. They're fully compatible with your computer system.

So far, so good. You get the same memory horsepower and you start saving immediately.

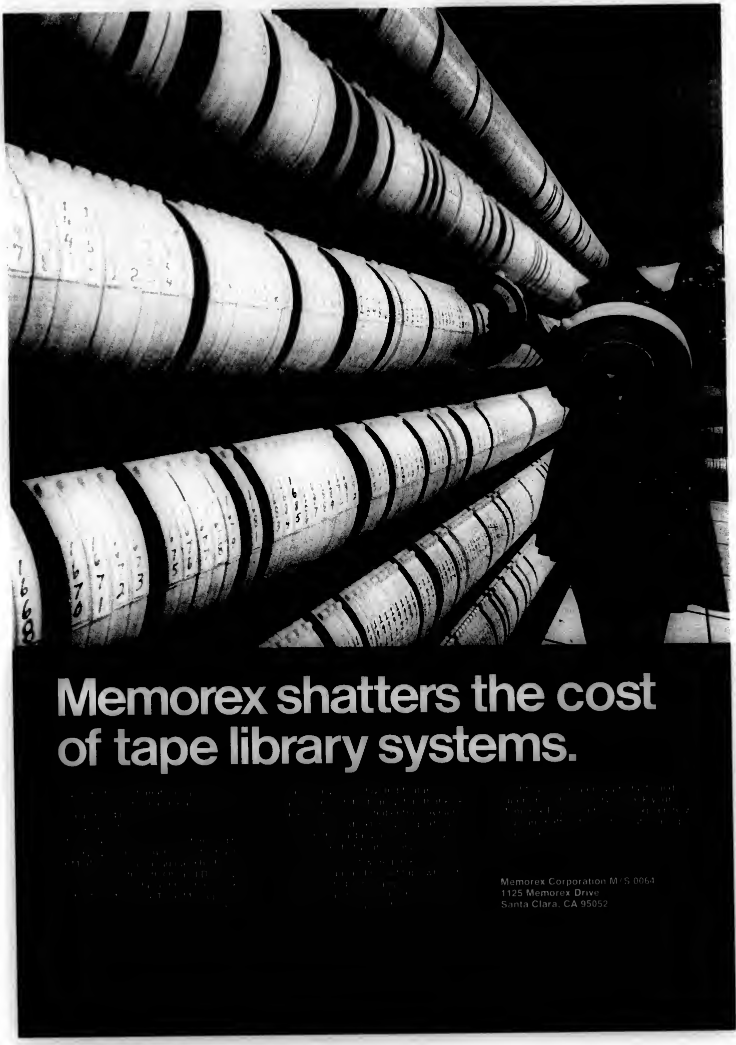
How about memory expansion? That's easy too. Memory Technology can increase the size of your IBM 370/155 or 370/165 up to 4 MB. That's a lot. And from a financial point of view, you can live a lot longer with your current computer and have it do more. Doesn't that make investment sense? We think so.

Installation time. Fast. Typically, less than 8 hours to install a 2 MB semiconductor memory on your 370/155; a shade longer for your 370/165.

Responsibility? Memory Technology is an American Research and Development Company, a Division of Textron Inc. With over 10,000 memory systems delivered, Memory Technology is one of the only memory system manufacturers to take full responsibility from engineering, manufacturing and marketing through maintenance.

Want to really make your computer system pay off? Call Jim Crough, (617) 443-9911, Memory Technology Inc., 83 Boston Post Road, Sudbury, Mass. 01776. He'll give you all the facts. Or, send for our new brochure.

MemoryTechnology



# Memorex shatters the cost of tape library systems.

[illegible]

Memorex Corporation M/S 0064
1125 Memorex Drive
Santa Clara, CA 95052

## Societies/ User Groups

# Afips Sets Guide for NCC Papers

CHICAGO – Afips has issued formal instructions for the submission of papers for the 1974 National Computer Conference and Exposition (NCC), to be held here May 6-10.

The deadline for submitting advance abstracts is Oct. 1.

New, hitherto unpublished papers, presenting original developments or of a tutorial nature, are being solicited. Total length of the work should not exceed 5,000 words, with each illustration counted as 300 words. Each paper must include an abstract of a maximum of 150 words.

Five copies of each manuscript and abstract must be submitted and a full set of illustrations properly keyed to the text must accompany each copy.

"Special emphasis will be placed on papers and presentations on developing new technology, innovative concepts and areas holding promise for the future," said Dr. Stephen S. Yau, conference general chairman. "Attention will also be focused on the effective use of our computers, our time and our people."

Suggested topics include computer architecture and hardware; software systems; computer networking; information management systems; management acceptance (including systems evaluation, systems performance, auditing of results and assessment of direct costs).

Applications of data processing technology will cover communications systems; health care and biotechnology; education (all levels); small and large manufacturing; distribution; retailing; government; finance – banking/insurance/investment; industrial process control and transportation.

Completed papers must be received by Nov. 15.

All abstracts and manuscripts should be submitted to Theodore M. Bellan, 74 NCC Program Chairman, Vice-President, Computer Services, McDonnell Douglas Automation Co., P.O. Box 516, St. Louis, Mo. 63166.

# Conference Views Micrographics

CW West Coast Bureau

LOS ANGELES – Comtec, a computer micrographic technology users group, has scheduled a conference Oct. 8-12 in St. Louis.

Al Aron, president, said the meeting will be held at Stouffer's Waterfront Inn and will feature seminars for novices and veterans in the field.

The first two days will be devoted to giving an introduction to COM from hardware, software and systems viewpoints, Aron said.

The next three days will focus on developments in COM and how users can increase capabilities, he said.

Don Gerlich of Information International, Inc. is overall program chairman.

Cost of the first two days will be $10 and the following three days, $15.

Information about the conference can be obtained from Comtec, P.O. Box 25605 West Los Angeles, Calif. 90025, or from Aron at P.O. Box 80848, Mail Zone 622, San Diego, Calif. 92138.

Aron, who is with Convair Aerospace, San Diego, said that Comtec's board of directors has agreed to table all discussion of any affiliation with the National Microfilm Association until the situation is clarified.

u·til·i·ty \yü-'til-ət-ē\ adj 1: capable of serving as a substitute in various roles . 2: kept for the production of a useful product rather than show . . 3: designed for general use n 4: the quality or state of being useful.*

*BY ANY DEFINITION (EVEN FROM WEBSTER'S SEVENTH NEW COLLEGIATE DICTIONARY), **UCANDU** ™ IS A UTILITY.

1. **UCANDU** CAN REPLACE MANY SPECIALIZED FILE COPY, RECORD SELECTION, TEST FILE GENERATION, DATA SET BACKUP, AND FILE REORGANIZATION PROGRAMS NORMALLY USED IN AN INSTALLATION.

2. THE USEFUL PRODUCT MIGHT BE A COMPLETE FILE COPY, A LISTING OF FIELDS SELECTED FROM A FILE, A RANDOM SAMPLING OF A FILE, A GENERATED TEST FILE, OR A DUMP OF A PORTION OF A PRODUCTION OUTPUT FILE.

3. ALMOST EVERYONE IN THE ORGANIZATION – OPERATIONS PERSONNEL, APPLICATIONS PROGRAMMERS, SYSTEMS PROGRAMMERS, AND AUDITORS – IS FINDING DOZENS OF USES FOR **UCANDU**.

4. **UCANDU** MUST BE USEFUL, SINCE MOST INSTALLATIONS THAT ACCEPT OUR FREE TRIAL OFFER DECIDE TO KEEP THE UTILITY.

**UCANDU** is a generalized utility which selectively lists, dumps, and copies OS/360/370 files. It is device-independent and processes both sequential and indexed sequential data sets. A simple, free-form parameter set provides data selection based upon record content, position, or both.

INTERESTED IN KNOWING MORE ABOUT **UCANDU**? LET US TELL YOU HOW YOU CAN TRY THE UTILITY FOR 30 DAYS, WITHOUT OBLIGATION. JUST LET US KNOW.

Gulf Oil Computer Sciences, Inc.
P. O. Box 2100
Houston, Tx 77001
713/228-7040

Gulf

**Sell Europe's largest EDP market this November.**

The Computer Caravan is a travelling computer users' forum and exposition that has created a whole new form of EDP marketplace, with a proven record of success. Two U. S. Caravans have produced a total attendance in excess of 50,000, and a remarkable sales record. Now we're going to Europe–starting with a four-city English Caravan in September, and a five-city German Caravan in November. Next spring, we'll follow with a French Caravan.

But we're not simply taking our American ideas and customs abroad. We know that the needs of EDP users differ from country to country, and we've arranged for local sponsorship and guidance for each European Caravan.

In Germany, a leading EDP marketing organization, AMS Market Services, will be in charge of Exhibit Management and Sales. Dr. Gerhard Maurer, a widely respected EDP expert, will manage our Forums; and promotional support will be provided through leading EDP trade publications.

Germany is Europe's largest EDP market, and the German Computer Caravan is a unique, new way for your company to increase its sales there. To get a free brochure, just send in the coupon below. We'll send out the details right away.

**The German Computer Caravan Schedule**

| | |
|---|---|
| Dusseldorf | Nov. 1-Nov. 3 |
| Hamburg | Nov. 6-Nov. 8 |
| Frankfurt | Nov. 13-Nov. 15 |
| Berlin | Nov. 20-Nov. 22 |
| Munich | Nov. 27-Nov. 30 |

TO: Neal Wilder
Vice President, Marketing
Computerworld
797 Washington Street
Newton, Mass. 02160
(617) 332-5606

Please send me further details on the European Computer Caravans.

Name ______
Title ______
Company ______
Address ______
City ______ State ______ Zip ______

The European Computer Caravans sponsored by COMPUTERWORLD

# The IBM 1130 - if you have one, keep it; if not, get one!

**LIBERATE** the inherent power and capability of the IBM 1130 System with Logicon enhancements – add-on core, high-speed printers, disk drives, tape system – increase the throughput up to 10 times and still enjoy the confidence that is yours with an IBM CPU and IBM maintenance.

**INTERFACE** your 1130 with up to 32 terminals simultaneously – CRTs, teletypes, analog or digital sensors, IBM selectrics, keyboards, counters, time-of-day clocks, etc. – with the LI/ON (Logicon Input/Output Network) designed specifically to let you communicate with the 1130.

**SAVE** dollars on your computer operations. In many cases, Logicon enhancements combined with the reliable, powerful IBM 1130 system will permit you to do much more work for much less money than you are now spending.

**NO MODIFICATIONS** are necessary with Logicon 1130 add-ons and peripherals. You don't have to violate the internal hardware integrity of your IBM 1130 system nor are source program changes required. All operations are within the framework of the disk monitor (DM2) system.

**LOGICON** is the world's largest supplier of IBM 1130 enhancements. Logicon peripherals, add-ons and communications interfaces are 100% compatible with the IBM 1130 system because they are specifically designed for the IBM 1130.

**WHERE** do you find out more about how you can continue to enjoy IBM dependability and service and still reap the benefits of increased throughput, greater capacity, higher speed, job flexibility and a lot more at a low, low cost. Call or write one of our nationwide offices listed below:

**LOGICON/INTERCOMP**

24225 Garnier Street, Torrance, California 90505
Telephone (213) 325-6060

68 Rogers Street, Cambridge, Massachusetts 02142
Telephone (617) 864-4700

Chicago O'Hare Aerospace Center
4849 N. Scott St., Suite 413, Schiller Park, Ill. 60176
Telephone (312) 671-5455

6200 Hillcroft, Suite 112, Houston, Texas 77036
Telephone (713) 772-6636

99 Jericho Turnpike, Suite 301, Jericho, N.Y. 11753
Telephone (516) 997-3888

Williamsburg Bldg., 22100 Mastick Road
Fairview Park, Ohio 44126
Telephone (216) 777-6648

6231 Leesburg Pike, Falls Church, Virginia 22044
Telephone (703) 534-7087

## CI Notes

### *Univac to Enter POS Arena*

NEW YORK – Univac has entered the point-of-sale arena with the acquisition of a developmental supermarket system from RCA.

In addition to rights to the system, Univac said it will hire a number of RCA employees who have been developing the system.

The acquisition consists of two basic types of checkout devices, automatic scanning and key entry. The scanning system uses a laser beam symbol scanner-reader. Both types will have a dual minicomputer with disk storage, software and key entry cash register.

### California Bid Fate Undecided

CW West Coast Bureau

SACRAMENTO, Calif. – The bid by IBM for the Stephen P. Teale Consolidated Computer Center meets the state's specifications but its fate is still up in the air.

An evaluation and recommendation committee had adjudged that IBM had "responded positively to all requirements in the invitation for bids and is committed to meeting all schedules."

IBM also committed itself to a fixed price, although state officials said they would not open the cost information portion of the bill until a bill can be passed by the legislature making it possible for the state to accept the bid.

### Univac, ISS Complete Pact

NEW YORK – Univac has acquired Information Storage Systems (ISS) from Itel Corp.

Univac made an initial cash payment of $23 million to Itel. Additional cash payments will be made contingent upon, among other things, sales to customers other than Univac during the balance of 1973 and the full calendar years of 1974 and 1975.

### Memorex Cuts Work Force

SANTA CLARA, Calif. – Memorex Corp. revealed it has cut the size of its work force by about 1,000 persons at all levels and areas of operation to reduce its operations.

The number includes a layoff of 300 persons Aug. 17.

### *Supershorts*

Shugart Associates has made its first product shipment, the SA900 Diskette Storage Drive, to Four Phase Systems.

– – –

Computer Machinery Corp. has signed a distributorship agreement with Informatica Nacional, S.A., for sale and service of its Keyprocessing Systems in Mexico.

– – –

Sanders Data Systems has selected Veritas International, Inc. to aid in developing international markets for its products.

### *Hardware Report – Part II*

# Japan Seen Rivaling U.S. Technology

By E. Drake Lundell Jr.

CW Washington Bureau

WASHINGTON, D.C. – Japanese computer hardware is rapidly approaching the technological level of its American counterpart, according to the recent report of the computer technology resources panel of the Computer Science and Engineering Board of the National Research Council.

The report of the now defunct group found that the major reason for the rapid buildup of Japanese computer expertise has been the major funding provided by the government, which supported one project between 1967 and 1970 with $24.1 million and has earmarked $97.2 million for the follow-on project to be completed in 1978.

Previously, most of the Japanese-produced computers were produced under license from U.S. manufacturers and there was little indigenous research in the country, the report said.

But now the Japanese are developing their skills in almost every area.

For example, in the large-scale area, previously almost the sole bastion of American-made machines, "the percentage of domestic computers in use is gradually growing as the Japanese ability to produce large high-speed machines is perfected."

### Super Machines Due

Presently, the report said, most growth is at the low end of the large-scale range of equipment, but it estimated the Japanese would be producing super-scale machines with the completion of the Japanese national computer project.

There is still a large market in Japan for U.S. minicomputer makers, but this market might not last long as the Japanese become more proficient, the report noted.

In addition, minicomputers might be the area that the Japanese will use for a large-scale penetration of the world marketplace.

Noting the similarities between the minicomputer and the electronic calculator, "one can surmise that the existing desk-calculator sales, marketing, and service organization throughout the world may well be utilized for the export of minicomputers," the report observed. In three years the Japanese calculators reached over 70% of the world market.

"The potential for Japanese export of minicomputers should not be ignored," the report said.

Many U.S. figures have noted the major area where the Japanese lag behind the U.S. as peripheral equipment, but the report warned this might not necessarily be true.

"At the moment the Japanese appear to have the technology and capability to produce peripheral equipment comparable to anything produced in the U.S., although possibly at this point in time not necessarily at competitive cost," the report noted.

"Finally, the major infiltration of the U.S. market and consequent undermining of the U.S. manufacturers' position through the original equipment manufacturer (OEM) of peripherals by Japan must not be overlooked," the report said.

"While this situation should stabilize as Japan is recognized as the competition, the Japanese ability to compete costwise, either by pricing based on greater volume or by planned policy, could result in Japan obtaining and holding a major piece of the 40% of the U.S. market that is non-IBM.

# GSA Report Indicates Success Of Basic Ordering Agreement

CW Washington Bureau

WASHINGTON, D.C. – A preliminary report by a study group in the General Services Administration found that the use of the "Basic Ordering Agreement" for software services has been successful and that its use should be spread to areas other than metropolitan Washington where the experiment was conducted.

The program standardizes job descriptions for programmers, analysts, communications specialists and other subspecialties in the software field and requires firms to submit hourly rates for each grade in which they had competence.

For example, if a firm wanted to do business with government agencies covered by the order, it would submit a master schedule of the hourly rates it would charge any government agency for those services.

Under the first year of the program it was reported that almost $3 million worth of orders were placed with the more than 100 firms that had signed up for the Basic Ordering Agreement, according to the GSA study.

But, the study indicated, only 39 firms received any business under the contract, while 66 on the list did not. In addition, it was found that almost $2 million worth of business under the BOA went to nine firms.

A total of 26 federal agencies used the BOA to get needed software expertise during the year, and eight of the agencies issued contracts that totaled more than $100,000.

From the top eight agencies issuing contracts came 75% of the business since they issued contracts with a value of over $2.3 million as a group.

While the preliminary report from GSA favored continuing the program and perhaps expanding it to other areas of the country, there are reports here that some GSA officials are opposed.

In addition, some sources have indicated that some of the contract software houses in the Washington area do not favor the contract, even though no one is speaking against it publicly.

# UK Caravan Ready to Roll

MANCHESTER, England – The UK Computer Caravan will make its first stop here Sept. 4 on its four-city tour, the first of the European Caravans to get under way.

Sponsored by *Computer Management*, and administered by IDC Europa Ltd., the caravan includes exhibits as well as user forums.

Prime Computer, Interdata, Varian Data Machines, System Engineering Labs Ltd., Data General and Univac are among the firms exhibiting.

Others are Computer Machinery, Post Office Telecommunications, Incoterm, Computer Technology Ltd., Phillips and BASF.

Forums are planned on data communications, data entry, and mixed systems hardware and software. Judith Beer, editor of *Computer Management*, said: "We will have local users talking to local users. The aim is to provide an opportunity for a serious exchange of experience and a chance to share answers to common problems."

Patrick J. McGovern, president of Computerworld, Inc., commented: "The computer user has matured in his approach to the equipment and services he requires. He is now directing the industry in the way he wants it to go, instead of accepting the dictates of the manufacturers. At the same time he demands local support and services . . .

"Taking these two aspects together, the fact that the show is built around user interests and has gained the support of many important companies in the industry, we see the UK Computer Caravan as a major confrontation between the two parts of the business – perhaps the most important Britain has ever seen," he observed.

With the four stops in Manchester, Birmingham, Edinburgh and London, the UK tour will bring the Caravan within 60 miles of 87% of all computer installations in Britain, according to conference organizers.

The German Caravan gets under way Nov. 1.

New System 370's
Attractive Delivery
Schedules.

For Sale or Lease. Terms: From 3 Years.
ITC Available. Contact Ed Tibbits or Dean Harrer.
at (315) 474-5776

CIS
CONTINENTAL INFORMATION
SYSTEMS CORPORATION

SYRACUSE, N.Y. Midtown Plaza 13210 (315) 474-5776

Delivery Schedules

| | |
|---|---|
| 370/145 Model I2 | |
| Immediate Delivery | |
| 370/158 Model J | |
| #1 Delivery . . . . . . . | 11/16/73 |
| #2 Delivery . . . . . . . | 11/16/73 |
| #3 Delivery . . . . . . . | 1/18/74 |
| #4 Delivery . . . . . . . | 2/15/74 |
| #5 Delivery . . . . . . . | 2/15/74 |
| #6 Delivery . . . . . . . | 3/22/74 |
| 370/168 Model K | |
| #1 Delivery . . . . . . . | 4/19/74 |
| #2 Delivery . . . . . . . | 5/17/74 |
| #3 Delivery . . . . . . . | 5/17/74 |

# Xerox Marketing Plans Focus On Growth of Multi-Use Systems

By Marvin Smalheiser
CW West Coast Bureau

EL SEGUNDO, Calif. – Multi-use computer systems are emerging as a major marketing strategy at Xerox computer operations.

John (Jack) Bonne, multi-purpose marketing manager, said the focus is on the user who is going to a second computer or an outside service bureau.

Xerox's market effort, Bonne said, is aimed at normal commercial or manufacturing companies.

"Generally, we're shooting at manufacturing firms which have a combination of batch and on-line requirements and further divided the batch and on-line requirements into administrative and engineering workloads."

"Anyone who is headed towards a terminal-oriented system would be wise to look at a multi-use system," he said.

Bonne defined multi-use as a system using multiple modes, including conversational time-sharing, computation, data entry, data base inquiry, batch processing and real-time.

The key factor is terminal orientation. "We find we are constantly expanding the terminal-oriented market. We think it is the way things are going in the future," Bonne said.

"Roughly 50% to 60% of the computers that we ship in the next five years will have terminal orientation and that involves machines in the $550,000 to $2 million category and above," he added.

"It is probably the largest single growing segment in the computer business in terms of annual shipments. Our market research tells us that the area is one of the greatest upsight potentials," he noted.

Bonne said 50% of Xerox's business is in the multi-use or commercial business. Nearly all the Sigma 6 and Sigma 9 models are in multi-use environments.

Xerox's multi use marketing effort is particularly strong in the education market, where its computers are used for administrative needs and academic requirements.

As an example, Bonne cited Carlton University in Ottawa, Canada, where two Sigma 9s have 64 time-sharing lines. The computers are also used for remote batch, local batch and transaction processing.

"The advantage to the school and students is that they have access to the computer at any time so they feel the computer is theirs," Bonne said.

"It's doing work for them any time they want to dial into the system. That eliminated a dedicated computer. The school is also doing the administrative work on the same computer.

"They can do all the necessary functions on one machine much cheaper than if they had to duplicate the capability at each locality to satisfy each of the needs," he said.

Similar multi-use systems are employed by Xerox in industrial environments such as McDonnell-Douglas Automation in St. Louis and at Western Electric in Atlanta.

### Cohabitation With IBM

A multi-use system doesn't have to be exclusively Xerox, Bonne said. "We view the multi-use market as one where we would do all the work in a shop or where we could cohabitate with IBM."

Software is not a major problem in setting up a multi-use system, he said.

"The challenge you have to address in a multi-use environment is the necessity of a rather sophisticated operating system capable of assigning priorities to system resources.

"Since you're not in a dedicated environment, the operating system has to be very sophisticated so it doesn't have a bias towards any one requirement. And if it doesn't handle the priorities right, you could have a real mess."

# Low-Cost Recording Units Seen Reaching $186 Million by '75

WELLESLEY, Mass. – Shipments of digital recording devices costing under $1,000 are projected to reach $186 million by 1975 and $379 million by 1980, according to a study by Venture Development Corp. (VDC).

The study suggested that 1973 will be the year that the low-cost data recording industry's growth rate begins to accelerate, growing at a rate of 30% to 35%.

Although the market for units based on the Philips cassette will grow, it will lose some ground to cartridge recorders and to "mini-disk" recorders, the report said.

Minicomputer manufacturers "will continue to integrate vertically toward the end user and either develop their own lines of data recording peripherals or acquire cassette, cartridge and disk manufacturers," the study continued.

## *Foreign Orders & Installations*

Eagle Star Insurance Group, United Kingdom, has ordered $450,000 worth of 804 display terminals and 810 clustered terminals from Sanders Associates, to be installed in regional and branch offices throughout the UK.

Kooperativa Forbundet, a Swedish cooperative wholesalers' group, has installed a Tesdata System 1000 Model 1155 measurement system.

Radyne Ltd., British manufacturer of high-frequency industrial and scientific heating and welding equipment, has ordered an NCR Century 101 for use in an inventory management and control system.

Nationaal Lucht-en Ruimtevaartlaboratorium (NLR), the Netherlands National Aerospace Laboratory, has ordered hardware, software and services from Control Data Corp. valued at more than $1 million. The contract includes the installation of a Cyber 70 Model 72 to replace a CDC 3300 system.

The Panama Canal Marine Bureau has installed an NCR Century 200 to help expedite ship passages through the canal.

British Leyland's Truck and Bus Division has installed two NCR Century 200s to handle production scheduling, purchasing control, and file maintenance. The twin computers are replacing two NCR 315s which had been in operation for nine years.

Integrert Databehandling A/s (IDA), Norway, has ordered a data communication system, including a C-8500 communication processor, from Collins Radio Co. The IDA system will be a nationwide network that will collect banking data and handle inquiry transactions.

Louis Cron Ltd., a Swiss investment company, has ordered an NCR Century 300 to serve as the nucleus of an on-line network linking the firm with its affiliated companies. The new system replaces a Century 100.

WE CALL THE 840 THE LOADED NOVA.

IT'S TOO BIG AND HAIRY TO BE A MINICOMPUTER.

By minicomputer standards, our new Nova 840 is big and hairy and costs a lot of money.

But, in terms of combined hardware/software performance, minicomputer standards just don't apply to the 840.

BIG HARDWARE

We loaded the 840 with a brand new Memory Management and Protection Unit that turns it into something far more than a minicomputer. MMPU lets the 840 grow to 128K 16-bit words (256K bytes) of main memory, and, most important, lets it take advantage of all the hairy software we've developed.

The 840 also comes with a whole list of peripherals and high-performance options, including a superfast new Floating Point Unit that handles single and double precision arithmetic at speeds that match most big computers.

HAIRY SOFTWARE

But hardware is only the vehicle. What makes the 840 a different kind of machine is software: the most powerful software available with any computer at anywhere near its price. Proven software we can deliver today.

It has a Real-time Disc Operating System that supervises the whole system; our new Fortran 5, that produces globally optimized, fast-executing code that's as efficient as machine language; Batch; remote job entry software; timesharing BASIC; and Extended Algol.

Dual Operations on the 840 lets you run any two major software streams concurrently and with complete security: multi-terminal timesharing BASIC along with remote job entry, or a real-time control application while you're doing prototype development in Algol.

THE PROOF

With all that hardware/software muscle, the 840 has embarrassed a lot of far bigger computers in price/performance benchmark comparisons.

For instance, there was the XDS Sigma 7 that was 40% faster running an independently conducted Fortran benchmark. And then got wiped out by the 840's more-than 10-to-1 price advantage.

Or the DECsystem-1050 that cost eight times more than the 840. And was actually 7% slower running the benchmark.

If you think those benchmarks are too good to be true, just call us. We'd love the chance to give you a lot more details on the benchmarks and how Data General software makes that kind of price/performance possible.

THE PAYOFF

We know that Data General isn't the only minicomputer company with a big hairy machine.

We also know that the 840 is, capability-for-capability, feature-for-feature, consistently less expensive than the competition.

And we know we can deliver the 840 faster than the competition can deliver their machines: 90 days after you call us with an order. (617) 485-9100.

## British Laan Aids ICL Development

**LONDON** – International Computers Ltd. has received a $64.5 million grant from the government to aid in the development of its "New Range" of computers. The grant is in addition to a previous $35.5 million extended in 1972.

Under the terma of the agreement, ICL will begin repaymenta during fiscal 1977-78 over a maximum period of seven years.

Eatimates of R&D costa between 1971 and 1978 for ICL's New Range total about $420 million, which makes the government's contribution about 25%.

ICL'a plans indicate no further financial aid will be required of the government after 1976.

GEC and Plessey, each of which holds about 20% interest in ICL, have agreed to raise up to $37.5 million "provided they are satisfied it will contribute toward ICL's development as a profitable company."

# Need for European IBM Regulation Cited

LONDON – One of the primary concerns of the European Economic Community should be the regulation of the manner in which IBM operations develop in Europe, according to Alex d'Agapeyeff, chairman of Computer Analysts and Programmers.

Policies should be based on a realization of the reasons for IBM's power, and should be uniformly applied throughout the EEC, he told attendees at a recent conference.

Efforts should be made to ensure that the controlling measures do not reduce the quality of European computing, he emphasized.

### Great Britain

Looking at the DP industry in Great Britain, he cited the need for a statement by the government on its intentions toward ICL and the entire UK industry.

He urged government support of the growth of software houses. A software house of comparable size to a large international accounting firm would aid in controlling "the IBM dragon," he said.

The profitability of software firms is presently very low, he said, noting this situation could lead to large-acale American competition if not remedied.

D'Agapeyeff urged that representatives of government and large DP companies formulate a plan concerning the policy of government intervention in the industry.

He noted that many DP achievements had been made with imported hardware and software, and that emphasis is currently being placed on the development of complex systems, when he is sure the eventual trend will be to simpler and less expensive microcomputers.

Europe is neglecting the telecommunications area, and could find itself overtaken by "underdeveloped" countries that could quickly install newer and more reliable methods of communication if it continues its practice of investment in maintaining outdated transmission systema.

# ECMA Issues New Disk Standards

GENEVA, Switzerland – The European Computer Manufacturers Association (ECMA) has issued a new series of standards for disks, as well as updated versions of previously published standards, which take into account field experience since the previous issues.

New standards are available for Mechanical, Physical and .Magnetic Characteristics of Interchangeable Single Disk Cartridges (ECMA-38) and for Track Format Characteristics of Interchangeable Single Disk Cartridges (ECMA-39).

Standards being reissued are 7-Bit Input/Output Coded Character Set (ECMA-6), Magnetic Tape Labeling and File Structure for Information Interchange (ECMA-13), Basic Mode Control Procedures for Data Communication Systems using the ECMA 7-Bit Code (ECMA-16), and Data Interchange on 3.81 mm Magnetic Tape Cassette (32 bpmm, Phase-Encoded) (ECMA-34).

Free copies of these standards as well as of other ECMA standards are available upon request from ECMA, 114 Rue du Rhone, 1204 Geneva.

## Aussie Treasury Orders 370 Far Accounting Systems

Special to Computerworld

CANBERRA, Australia – The Federal Government here has decided to buy an IBM 370/158 for $3.4 million.

The 370 will take over a job now being done on Control Data equipment.

When fully developed the new installation will process Treasury Department's accounting systems in Canberra, and all states and territories, which are now processed on CDC computers operated by the Bureau of Census and Statistics.

The treasurer, Frank Crean, said the system will form a central computing installation within the Treasury building.

## Basic/Faur Sets Dealerships

SANTA ANA, Calif. – Basic/Four Corp. is establishing a dealership network in a move toward marketing its equipment on a nationwide basis.

Basic/Four presently markets its systems directly in Los Angeles, San Diego, New York City, Springfield, N.J., Chicago, Boston and Long Island.

The company will contract dealerships to market its product in other major cities.

VOLUME
KEY PUNCHING
(402) 346-0330
"JUST MINUTES AWAY"
AMERICANA
KEY PUNCH
Redick Tower
Omaha, Nebraaka 68102

CASH PAID
for TELETYPE
PLUS ALL ACCESSORIES
NEW OR USED
CALL (214) 252-7502
TWX-910-860-5761
OR WRITE
vardon & associates, Inc.
930 N. Beltline, Suite 140
Irving, Texas 75062

THE MAGIC OF VIDEO INQUIRY

The Digi-Log Interactive Video Terminals add a new, silent dimension to file inquiry systems.

**Like Magic,** these silent windows into your files quickly and quietly present a record for viewing or verification by the operator, customer, client, or patient.

**Like Magic,** inquiries can be made for account status . . . sales by region . . . credit . . . personnel records . . . or reservations, and output is provided without the fuss and waste of unnecessary printouts.

The Digi-Log terminals are teletype and TV compatible and,

**Like Magic,** cost less than $1,000 in quantity.

For **your** magic of video inquiry call now for immediate attention, 215 659-5400.

**DIGI - LOG**
**SYSTEMS, INC.**
666 Davisville Road
Willow Grove, Pa. 19090

### For Six Months

# Boothe Loses $1.9 Million

SAN FRANCISCO – Boothe Computer Corp. reported a six-month loss of $t.9 million for the six months ended June 30.

In the t972 period, for which figures are not adjusted to reflect a later one-time $36.5 million depreciation charge, the firm earned $t.2 million or 57 cents a share, of which $t.t million or 53 cents came from extraordinary gains from sales of stock of subsidiaries.

## Revenues Decline

Revenues for the half year fell to $24.6 million from $30.2 million.

Quarterly revenues dropped to $t3.3 million from $14.2 million. The loss was $820,000 or 38 cents a share compared with earnings of $757,000 or 36 cents per share in the 1972 period, when there was an $850,000 extraordinary gain.

The agreement between Wells Fargo Bank and Boothe Credit Corp., a subsidiary, has been executed, Boothe said. The agreement extends a $5 million line of credit from June 30 through Dec. 31, 1973. Funds will be used to provide lease financing for Courier Terminal Systems equipment.

# Dearborn Changes 360 Depreciation

CHICAGO – Dearborn-Storm Corp. has changed its depreciation policy for its portfolio of 360s, which, after deferred tax reversals of $5.2 million, will reduce 1973 earnings by $4.9 million or about $1.80 a share.

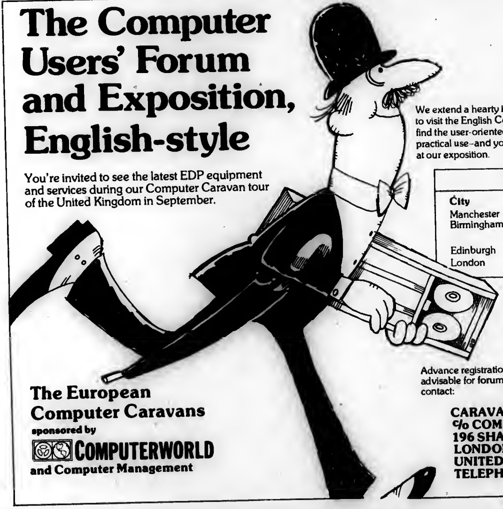
The company has provided additional depreciation, primarily for certain peripheral equipment; revised the estimated residual value of its portfolio from 10% to 4% of original cost, and adopted the break-even policy of providing depreciation at the same rate that each period's anticipated revenues bear to total projected revenues through Oct. 31, t978.

"Our computer leasing business has been holding up well relative to our competition," a spokesman said. "However, recently there has been increased speculation about the likelihood of radical new product announcements by IBM within the next two years and other risks related to the future marketability of Model 360 computers."

# Pitney Bowes-Alpex Shows Quarter Loss

DANBURY, Conn. – As anticipated by the firm, Pitney Bowes-Alpex, Inc. continued to show a loss for the quarter ended June 30, with a loss of $3.2 million on revenues of $5.1 million. The firm shipped more than $2 million worth of equipment in June, and to date has shipped 6,000 registers to more than 300 stores in the U.S. and Canada, a spokesman said.

As of June 30, order backlog stood at about $22 million of which about $15 million were firm and about $7 million options on firm orders.



**The Computer Users' Forum and Exposition, English-style**

You're invited to see the latest EDP equipment and services during our Computer Caravan tour of the United Kingdom in September.

We extend a hearty invitation to our English and European readers to visit the English Computer Caravan during September. You'll find the user-oriented forums and workshops to be of immediate, practical use–and you'll see the latest EDP equipment and services at our exposition.

**Here's the schedule:**

| City | Dates | Location |
|---|---|---|
| Manchester | Sept. 3-5 | New Century Hall |
| Birmingham | Sept. 11-13 | Great Hall, University of Birmingham |
| Edinburgh | Sept. 18-20 | MacRobert Pavilion |
| London | Sept. 25-27 | Europa Hotel |

Advance registration is not necessary for the exposition, but is advisable for forum attendees. If you'd like further information, contact:

**CARAVAN REGISTRATION**
**c/o COMPUTER MANAGEMENT**
**196 SHAFTESBURY AVE.**
**LONDON, WC2H 8JL**
**UNITED KINGDOM**
**TELEPHONE: 012401024**

**The European Computer Caravans**
**sponsored by**
**COMPUTERWORLD**
**and Computer Management**

# Ball Finances Tally, Names 4 to Board

KENT, Wash. – Ball Corp. has agreed to provide Tally Corp. with $1.5 million in financing, and has placed four men on the firm's eight-man board of directors.

Richard M. Ringoen, vice-president and general manager of Ball Brothers Research Corp., a subsidiary, has been elected chief executive officer and chairman of the executive committee.

James E. Navarre remains as president.

The National Bank of Commerce of Seattle has extended for one year its existing $750,000 line of credit.

For the second quarter Navarre said the company could have met its operating plan and reported a profit if it could have avoided work stoppages and inefficiencies resulting from the inability, because of cash limitations, to establish a satisfactory flow of parts from its suppliers.

In addition, Tally Leasing Co. suspended its lease financing agreement, which resulted in reduced revenues and placed increased cash flow burdens on the company, he said.

The second quarter loss was less than that of a year ago; however, in the six months the deficit grew.

For the three months, the firm had an operating loss of $169,328 compared with $208,120 for the year-ago quarter, despite declining revenues, which fell to $2.8 million from $3.4 million.

A loss of $111,261 from the sale of its EDP Division was also reported fro the quarter.

In the six months, Tally's operating loss was $504,503, compared with $430,142 during the same 1972 period. Revenues totaled $5.9 million compared with $6.2 million.

The backlog of released orders totaled $6.4 million July 29, compared with $2.3 million at the beginning of the year, Navarre said.

Terms of the agreement call for Ball to provide Tally with up to $1.5 million of collateralized credit in the form of demand notes at interest rates approximating Ball's cost.

In return, Ball received about 1.6 million warrants for Tally stock, exercisable at $3 per share within five years. The warrants represent all of its authorized but unissued and unreserved common shares, Tally said.

Under the terms of the agreement, Ball will relinquish these warrants in the event it withdraws its loan before Tally is able to establish its own line of credit.

Ball Brothers Research Corp.'s products include computer subassemblies and data display devices.

S/370 155 and 155 II
WALKAWAY LEASES

Also for Sale or Lease
IBM New 370/158 or 168 CPU
IBM 3360 Model 3 Processor Storage

October Installation

1 Megabyte Memory and Console

| | Monthly Lease Rates | |
|---|---|---|
| | 2-yr Lease | 3-yr Lease |
| Model 155 | $23,750 | $21,950 |
| Model 155-II (VS) | $28,500 | $26,450 |

Call or Write: Commonwealth Computer Advisers, Inc.
106 N. Eighth Street
Richmond, Virginia 23219
(804) 643-9123

# DP Services Firm Uses 'Unobtrusive' Approach

By Marion Rubinstein

Special to Computerworld

HOUSTON – To provide total service to hospital administration on a personalized basis, Medical Dimensions, Inc. "constantly strives to keep the computers, peripheral equipment, terminal devices, communications network and any other tangible devices that are utilized as completely in the background as is possible," observed President O.B. Frasier.

"All of these items are considered simply tools of the trade and should remain as transparent and unobtrusive as possible. Our total emphasis is on producing the highest quality and most dependable results possible, within a completely justified cost range."

"We do not consider that there is a market of 8,000 plus hospitals for a system. It is our opinion that there are 8,000 plus individual markets for personalized administrative services."

The company has grown since its first hospital client in 1965 to a list of over 100 hospitals in 10 states. "In the last three years, since the company was incorporated under the name of Medical Dimensions, the client base has expanded over 1,200%," Frasier said.

"In instances where hospitals have attempted to provide computer facilities to fulfill all of their individual requirements, the Medical Dimensions approach will actually allow a reduction in costs due to the capability of spreading the burden of extremely costly fixed expenses among Medical Dimensions' wide client base," he said.

## Expansions

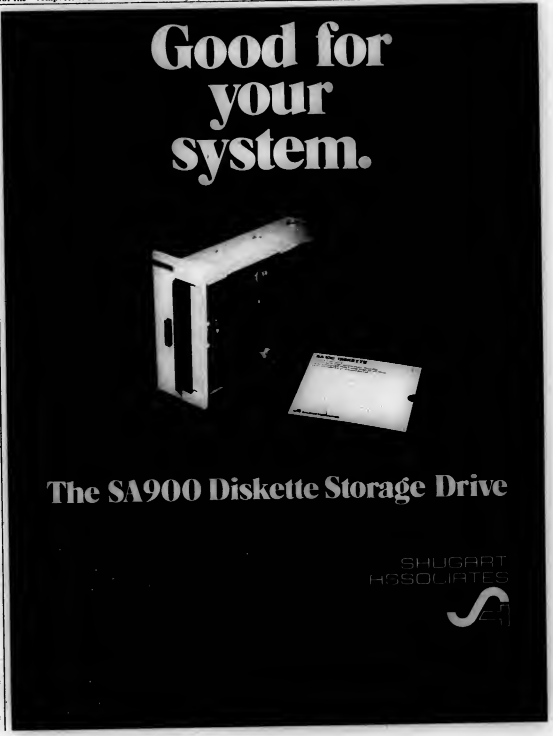
Inforex, Inc. has started construction of a 130,000-sq-ft manufacturing and warehousing facility adjacent to the company's headquarters in the Northwest Industrial Park, Burlington, Mass.

**Hewlett-Packard Co. will begin construction by late 1974 of a plant in Boise, Idaho, which will be occupied by part of the company's Data Systems Division, headquartered in Cupertino, Calif.**

Univac has leased 17,500-sq-ft at 6700 West Loop South, Houston, to provide better marketing and educational programs for prospective customers.

**Graham Magnetics, Inc. has contracted for a 47,556-sq-ft plant addition to its Graham, Texas, facilities, to provide manufacturing capacity for new products and for expansion of current production.**

Interdata, Inc. has opened a sales/service office for Missouri, Kansas and Nebraska.



# Investigators Still Seek PGI 'Fire File'

**Special to Computerworld**

CHERRY HILL, N.J. – Investigators looking into the affairs of the now-closed Peripherals General, Inc. (PGI) have so far failed to locate the "fire file" which contains all the firm's most valuable drawings and plans on microfilm.

The file, normally kept in a fireproof vault, was apparently not found when inventories of the contents of the building were taken.

However, a number of places have not been searched yet and the file may still be found, officials said. Neil Petermen, the former president of PGI, told *Computerworld* the file was on the premises.

Sources close to the investigation indicate the file would permit an organization to duplicate all the work put into the PGI Universal Controller and PGI's IBM and GE replacement disk drives and systems. This work was regarded as a major asset of the corporation.

The question of why the firm closed down without making any legal provision for the reorganization of the business and its continuation was raised by a number of shareholders, led by former President Jemes Linnell.

Linnell, who was ousted as president last April, said his own state petition for trusteeship had at least served to protect the interest of stockholders, but that it had now been superseded by a Chapter 10 petition from creditors in the federal court.

A Chapter 10 petition is for involuntary bankruptcy, as opposed to a Chapter 11 for voluntary bankruptcy.

Linnell said he is forming a shareholders committee to see that their rights are protected as much as possible.

The next step in the proceedings will be up to Stanton D. Freeman, the court-appointed receiver, who will hold the first public hearing in the case. The date for the hearing has not yet been scheduled. Kleinberg, Maroney, Mesterson and Schechter of Newark, N.J., will represent PGI.

### Unexplained Happenings

The absence of the "fire file" is actually the third unexplained circumstance since the firm quietly closed its doors in July.

Other cases were:

- The removal of $500,000 worth of inventory from the premises by the First National City Bank of New York after a restraining order had been granted forbidding the removal of anything from the premises [CW, Aug. 15].
- The apparent failure of the firm to deliver goods it had in stock against a reported $1.7 million backlog.

Former employees indicated sales of $500,000 worth of GE replacement equipment had been made, but that deliveries had not taken place.

They said the $500,000 inventory was 95% complete, and that only $30,000 worth of easily obtainable parts had been needed since April to ship the goods, thereby avoiding the financial crisis.

# PGI President Explains the 'Mess'

"I resigned from PGI as vice-president in June, but they persuaded me to take over the presidency from Carl Fisher. Now I am stuck with this whole mess," commented Neil Petermen, the last president of PGI, as he spoke about PGI's troubles and answered various questions raised by the company's recent closing.

The reason why the inventory, valued at $500,000, had not been used to fill the $1.7 million backlog was because of the ownership of the inventory, he said. The inventory was owned by First National City Bank, a secured creditor, and as a result, the unsecured trade creditors amounting to $800,000 were not prepared to advance the trade work needed to put the inventory in shape for customer shipment, Petermen explained.

Peterman said no petition for reorganization was presented under Chapter 11 because there was "no interest" in such a reorganization. "The only investor that would put money in was Prudential. They refused to refinance us until we had reached a settlement with all our creditors," he said.

Apparently, the creditors refused to settle, and were pressing for receivership, so the firm closed its doors. Currently they are trying to arrange for an assignment of assets.

The backlog figures reported are "phony" he said, because they include many contingent contracts for disk drives.

The decision in principle to cease manufacturing disk drives was made in May [CW, Aug. 15], Petermen explained, because PGI found it could buy disk drives cheaper than it was making them.

The removal of the inventory after the restraining order had been served occurred while the building was posted with notices of the order. Peterman said the inventory belonged to First National City Bank, and that he had operated under attorney's instructions.

Peterman blamed the firm's crash on managerial failures. "The board of directors was misled by the presentations they were given, which glossed over the real difficulties. As a result there was too much exposure involved for us to find new investors when the real situation became known."

Peterman, who had been a director, said he had not brought the difficulties up at the board meetings.

"It's very difficult to bring difficulties up when you are an insider," he commented. When the vice-president of finance, Eugene Geren, mentioned difficulties he was fired, Peterman said.

# *Earnings Reports*

**GREYHOUNO COMPUTER**
Three Months Ended June 30

| | e1973 | 1972 |
|---|---|---|
| Shr Ernd | $.14 | $.24 |
| Revenue | 10,779,000 | b11,779,000 |
| Earnings | 807,000 | 1,039,000 |
| 6 Mo Shr | .29 | .50 |
| Revenue | 21,345,000 | b23,897,000 |
| Earnings | 1,248,000 | 2,179,000 |

e-Includes results of Bresnahan Computer Corp. acquired June 1, 1973. b-Restated to reflect full consolidation of wholly-owned foreign subsidiaries.

**WAVETEK**
Three Months Ended April 14

| | 1973 | 1272 |
|---|---|---|
| Shr Ernd | 9.15 | 9.06 |
| Revenue | 1,991,400 | 1,185,930 |
| Earnings | 128,904 | 36,653 |
| 8 Mo Shr | .33 | .20 |
| Revenue | 4,264,053 | 2,800,949 |
| Earnings | 284,645 | 150,839 |

**AOORESSOGRAPH MULTIGRAPH**
Three Months Ended April 30

| | 1973 | 1972 |
|---|---|---|
| Shr Ernd | $.40 | $.74 |
| Revenue | 130,480,000 | 121,303,000 |
| aSpec Cred | 384,000 | ..... |
| Earnings | 3,201,000 | 6,872,000 |
| 9 Mo Shr | 1.09 | 1.30 |
| Revenue | 361,181,000 | 319,038,000 |
| aSpec Cred | 1,214,000 | ..... |
| Earnings | 8,785,000 | 10,471,000 |

a-Gain from foreign exchange adjustments; in the nine months also includes gain from sale of surplus plant.

**OIGI-LOG SYSTEMS**
Three Months Ended March 31

| | 1973 | 1272 |
|---|---|---|
| Revenue | 9212,400 | $52,438 |
| Loss | 118,229 | 48,090 |
| 8 Mo Rev | 384,312 | 111,639 |
| Loss | 195,714 | 94,791 |

**DATA PRODUCTS**
Three Months Ended June 30

| | 1973 | 1972 |
|---|---|---|
| Shr Ernd | $.25 | 9.05 |
| Revenue | 18,677,000 | 13,927,000 |
| Tax Cred | 819,000 | 163,000 |
| Earnings | 1,714,000 | 349,000 |

**APPLIED DATA RESEARCH**
Six Months Ended June 30

| | 1973 | a1972 |
|---|---|---|
| Shr Ernd | 9.12 | 9.10 |
| Revenue | 5,089,129 | 4,425,831 |
| Earnings | 136,527 | 94,103 |

a-Restated.

**SANGAMO ELECTRIC**
Six Months Ended June 30

| | 1973 | 1972 |
|---|---|---|
| Shr Ernd | $.83 | 9.67 |
| Revenue | 47,827,000 | 42,391,000 |
| Earnings | 2,235,000 | 1,621,000 |

**COOEX**
Three Months Ended June 30

| | 1973 | 1972 |
|---|---|---|
| Shr Ernd | 8.38 | 9.21 |
| Revenue | 2,149,000 | 1,288,000 |
| Tax Cred | 257,000 | 124,000 |
| Earnings | 648,000 | 277,000 |
| 9 Mo Shr | .96 | .16 |
| Revenue | 6,222,000 | 2,892,000 |
| Tax Cred | 854,000 | 90,000 |
| Earnings | 1,377,000 | 194,000 |

**CENTRONICS DATA COMPUTER**
Year Ended June 30

| | 1973 | 1972 |
|---|---|---|
| Shr Ernd | 91.01 | $.31 |
| Revenue | 24,027,000 | 6,723,000 |
| Tax Cred | ..... | 830,000 |
| Earnings | 4,880,000 | 1,480,000 |
| 3 Mo Shr | .36 | .13 |
| Revenue | 8,114,000 | 2,728,000 |
| Tax Cred | ..... | 278,000 |
| Earnings | 1,730,000 | 621,000 |

**TEXAS INSTRUMENTS**
Three Months Ended June 30

| | 1973 | 1972 |
|---|---|---|
| Shr Ernd | $.90 | a9.54 |
| Revenue | 316,362,000 | 236,355,000 |
| Earnings | 20,391,000 | 11,844,000 |
| 6 Mo Shr | 1.73 | a1.02 |
| Revenue | 605,390,000 | 452,117,000 |
| Earnings | 39,255,000 | 22,621,000 |

a-Adjusted to reflect two-for-one stock split effective April 30, 1973.

**LOGICON**
Three Months Ended June 30

| | 1973 | 1972 |
|---|---|---|
| Shr Ernd | $.08 | 9.15 |
| Revenue | 3,887,029 | 3,042,647 |
| Earnings | 70,983 | 130,367 |

**MILGO ELECTRONIC**
Three Months Ended June 30

| | 1973 | 1972 |
|---|---|---|
| Shr Ernd | 9.51 | $.36 |
| Revenue | 5,816,000 | 3,480,000 |
| Earnings | 807,000 | 571,000 |
| 9 Mo Shr | 1.44 | .89 |
| Revenue | 15,821,000 | 8,944,000 |
| Earnings | 2,286,000 | 1,422,000 |

**COMPUTER OESIGN**
Three Months Ended June 30

| | 1973 | 1972 |
|---|---|---|
| Shr Ernd | $.20 | ..... |
| Revenue | 7,172,705 | 92,452,339 |
| Earnings | 333,835 | (366,943) |
| 9 Mo Shr | .31 | ..... |
| Revenue | 12,888,807 | 8,786,627 |
| Earnings | 618,587 | (241,996) |

**GRANITE MANAGEMENT**
Three Months Ended May 31

| | 1973 | a1972 |
|---|---|---|
| Shr Ernd | $.02 | 9(.08) |
| Revenue | 6,307,000 | 8,072,000 |
| Tax Cred | 25,000 | ..... |
| Earnings | 62,000 | (229,000) |

a-Restated to reflect year-end adjustments.

# Position Announcements

## SYSTEMS PROGRAMMERS

**Northern New Jersey**

Excellent career opportunities exist for individuals with IBM background, knowledge of OS (MFT, MVT, and/or VS-1 and/or VS-2) and/or HASP, systems generation, performance, measurement and tuning also desirable. Knowledge of Assembler language essential. We are the fastest growing company in Remote Access Computer Service and offer a tremendous atmosphere for professional growth and development. The comprehensive compensation package includes totally company paid benefits and rewards for outstanding performance.

To explore these unique opportunities please rush your resume indicating salary history in strict confidence to:

Personnel Manager
P.O. Box 1025
West Caldwell, N.J. 07006
*An Equal Opportunity Employer M/F*

## AGENTS WANTED

We need sales representation in several locations in the U.S.A., Canada and Mexico by agents who are willing to guarantee results. Two of our major software products, WORK TEN, a COBOL generative language and RSVP, a user oriented report retrieval system, are presently installed in over 150 locations world-wide. Plenty of excellent references available. Send qualifications and requests for information to:

Frenk U. Beck
NCI, Inc.
6075 Roswell Road
Atlenta, Georgia 30328

## THE VIEW IS GREAT

San Francisco Bay – that's where we're located. Our offices have a great view of the Bay. With a golf course on the other side. That's a big view either way.

And there's a big view inside too. We're a medium-sized insurance company with an ambitious view toward growth. And your role as a programmer/analyst here gives you a big view of the company's entire operation. You are more than just a piece of the system – you are a valuable and recognized contributor to our growth.

If you'd like to set your sights on a bigger view, we'd like to talk with you. We are actively seeking two programmer analysts with insurance applications experience, 360 exposure and a solid foundation in COBOL. To apply for these openings, send your detailed resume with salary history to:

John C. Ross
**CALIFORNIA CASUALTY MANAGEMENT CO.**
P.O. Box M
San Meteo, Calif. 94402

## SYSTEMS ANALYST

Growing company has excellent opportunity for individual with degree in engineering, mathematics or equivalent experience to work on state of the art interactive design drafting system.

Successful candidate will have experience in machine language and higher level language on digital scientific computers. Background in data base design, computer graphics or time shared operating systems an asset.

Excellent starting salary, ideal professional environment and full fringe benefit program.

To arrange confidential interview send resume to Watson Peterson, Jr., Director of Personnel

**Gerber Scientific Instrument Company**
83 Gerber Road, South Windsor, Conn. 06074
*An Equal Opportunity Employer*

## *Computerworld Sales Offices*

**Vice President–Sales:** Neal Wilder. **Sales Administrator:** Dottie Travis. Computerworld, 797 Washington St., Newton, Mass. 02160. Tel: (617) 332-5606.

**Northern Regional Manager:** Robert Ziegel. Account Manager: Mike Burman. Computerworld, 797 Washington St., Newton, Mass. 02160. Tel: (617) 332-5606.

**Eastern Regional Manager:** Donald E. Fagan. Account Manager: Frank Gallo. Computerworld, Suite 1511, 225 W. 34th St., New York, N.Y. 10001. Tel: (212) 594-5644.

**Los Angeles Area:** Bob Byrne. Robert Byrne & Assoc., 1541 Westwood Blvd., Los Angeles, Calif. 90024. Tel: (213) 477-4208.

**San Francisco Area:** Bill Healey. Thompson/Healey Assoc., 1111 Hearst Bldg., San Francisco, Calif. 94103. Tel: (415) 362-8547.

**Japan:** Kan Suzuki. General Manager, Dempa/Computerworld, 1-11-15 Higashi Gotanda, Shinagawa-ku, Tokyo 141.

**Unique need for EXPERIENCED 360/370 COBOL PROGRAMMER in Northeast Mississippi. Applicant should also be experienced in AUTOCODER 1400.**

We have immediate need for Autocoder program maintenance in interim period prior to full conversion (to native language) currently in process.

Public utility experience helpful, not essential. Multiple System 370 installation teleprocessing system. Excellent growth potential and exceptional fringe benefits.

**Resume to General Manager**
**P.O. Box 348**
**Tupelo, Miss. 38801**
**or call (601) 842-5962**

---

# *PROGRAMMER ANALYSTS*

Challenging new positions for experienced individuals to further apply their programming skills. Responsibility will be for production applications such as production and inventory control and cost systems. We have a 370/135 DOS and prefer related manufacturing experience.

These positions are due to continued growth of our expanding company. We offer top compensation and excellent benefits including paid insurance. Call or send resume: Personnel Supervisor, PANDUIT CORP., 17301 Ridgeland Avenue, Tinley Park, Illinois 60477. (312) 532-1800.

PANDUIT CORP.

*An Equal Opportunity Employer*

---

# EDP PROFESSIONALS
## Australia

CSA is a fast growing, dynamic company of 360 professional staff. We are the largest local independent software company providing a comprehensive range of facilities management and EDP consultancy services together with an interstate timesharing network (UNIVAC 1108).

Planned development creates the need for more specialists for consulting assignments, including the implementation of a large data base real-time network linking minicomputers to a UNIVAC 1110 and other client assignments such as the design and development of financial accounting, military command and control, commercial and industrial applications on a variety of computer models. Positions are based in Sydney and Melbourne. Generous relocation expense subsidy will be provided.

Specifically, we seek Systems Programmers, Programmer/Analysts, Utility Software Design Analysts, Programmers (PL/1, COBOL, FORTRAN, UNIVAC Assembler), Project Managers, and Marketing Representatives.

You should have experience in one or more of the following:

- **Software Development**
- **Communication Network**
- **Minicomputer Software**
- **Integration Testing**
- **Computer Simulation Models**
- **Systems Analysis and Design**
- **Operating Systems Support**
- **Training and Education of Users**
- **Applications Programming**
- **Multi-programming On-Line Systems**
- **Marketing EDP Services**

Please AIRMAIL your resume at your earliest convenience as we will be visiting North America shortly to conduct interviews. Successful applicants will be expected to migrate for permanent settlement in Australia. In particular, inquiries from Australians interested in returning home would be welcomed.

## COMPUTER SCIENCES OF AUSTRALIA PTY. LIMITED

**460 Pacific Highway, St. Leonards. 2065, N.S.W., Australia.**

---

# COMPUTER HARDWARE MANAGER

We presently have need for a new Computer Hardware Manager within our expanding Wall Street Data Center. Individual selected will work with the latest in computer technology, i.e. twin IBM 370/155's under OS/MVT. We also are presently implementing an on-line teleprocessing system.

Will supervise the evaluation and selection of new computer equipment and maintenance services for the continued development of our growing systems while dealing with various vendors. Will also be responsible for investigating existing hardware monitoring devices to help in this task and to improve overall configuration cost effectiveness. Desire 2-5 years related experience with thorough knowledge of compatible equipment for the IBM 370 system. Salary range $17,000 to $18,500.

Please send resume including salary requirements to: Director, Hardware & Communications, P.O. Box 95, Bowling Green Station, N.Y., N.Y. 10004

*An Equal Opportunity Employer M/F*

---

# SYSTEMS PROGRAMMER - STATE OF WISCONSIN

Wisconsin Civil Service Classification: Management Information Specialist 4 — Software Programmer. One vacancy with the Department of Industry, Labor and Human Relations/Systems and Data Processing, Madison, Wisconsin. JOB DESCRIPTION: Systems programmer for an IBM S/370 155 under O/S — HASP. QUALIFICATIONS: Three years of progressively responsible experience in various professional data processing or management information activities, including one year of systems programming and/or assembler language experience. SALARY: Starting salary between $1082-$1217 per month. Excellent fringe benefits. Send resume to: Dennis H. Janis, DILHR Personnel, P.O. Box 2209, Madison, Wisconsin 53701 or call me at (608) 266-1074. Apply by September 13, 1973.

*AN EQUAL OPPORTUNITY EMPLOYER*
*FUNCTIONING UNDER AN AFFIRMATIVE ACTION PLAN*

---

# EDP PROFESSIONALS

NO YES

We are not in the market for EDP professionals who wish to remain technicians. If you desire a staff position, please do not respond. We do not consider those who are unwilling or unable to sell their problem-solving skills.

We would like to hear from you if you:

- **Are a systems analyst with 2-5 years experience.**
- **Have a solid applications and programming experience.**
- **Desire to manage and sell.**
- **Would like to be rewarded commensurately with your performance.**
- **Have a degree.**

If your interests and qualifications match our requirements we would like very much to talk with you about a challenging and rewarding career with the Chicago office of a highly regarded national consulting firm.

Please send your resume with salary history in confidence to:

**CW Box 3913**
**797 Washington Street**
**Newton, Mass. 02160**
*An equal opportunity employer*

---

# PROGRAMMER / ANALYSTS

We are currently involved in some of the most exciting projects a professional programmer could seek.

A.G. Becker is a prominent investment banking firm whose Chicago offices are in the First National Plaza. Our Funds Evaluation Division is developing a new financial application which requires expanding our programming staff to include another well experienced scientific programmer.

**We need a talented person with the following qualifications:**

2-3 years programming experience on the 360/370 series
OS background
Fortran and/or PL-1 language required
. Strong academic preparation (M.S. preferred)

Salary is commensurate with experience. Our excellent benefits include a unique profit sharing program.

To confidentially discuss these projects and your professional background, send letter or resume, with salary history to Mr. Arthur Miller.

**First National Plaza, Chicago, Ill. 60670**

***A.G. Becker & Co.***
INCORPORATED

*An Equal Opportunity Employer*

---

### DP MARKETING MANAGER

Nationally known Corporation is seeking an experienced individual to assume responsibility for Data Processing Marketing Function. Assignment would include complete responsibility for marketing, planning and executive of DP Packages. Successful candidate will have a degree in Marketing or Business Administration with a minimum of 4 years in DP Software Package Sales and including some supervisory responsibility. Financial or health care background desirable. Send resume and salary listing to:

**CW Box 3910**
**797 Washington Street**
**Newton, Mass. 02160**
*An Equal Opportunity Employer M/F*

---

# D.P. MARKETING REPRESENTATIVE

**Large computer leasing company expanding its activities in the sale of pre-owned equipment needs experienced marketing type. Send your resume in confidence to:**

**CW Box 3900**
**797 Washington Street**
**Newton, Mass. 02160**

---

### CONTROLLER AND DATA PROCESSING MANAGER

Dynamic company has unusual opening for "people-oriented" manager. This person will head accounting and data processing sections as well as do programming. Our IBM System 3 data processing is highly innovative. We also have rapidly growing computer service bureau for other area firms. Accounting and extensive data processing a must. Delightful small town living, excellent working conditions, many fringe benefits. Salary $16,000 per year. This is an excellent opportunity.

**Write: Personnel Manager**
**Liberty Petroleum Co., Inc.**
**P.O. Box 1209**
**Mt. Vernon, Illinois 62864**

**All inquiries will be kept confidential.**

---

### MANAGER CUSTOMER SUPPORT SERVICES

Large Indiana Health Care Organization offers a challenging career opportunity for experienced individual to manage customer applications, installation and maintenance support. Responsible for post sales installation of systems and applications, modify software specifications to meet new customer requirements, instruct customers in the use of newly installed systems and provide effective customer support services to meet all problems and complaints. Successful candidates will have a degree with a minimum of four years experience in System and Programming, knowledge of Accounting principles, and management experience. Familiarity with EDP Sales and Customer orientation highly desirable. For prompt consideration, please forward resume and salary history to

**CW Box 3911**
**797 Washington Street**
**Newton, Mass. 02160**

*An Equal Opportunity Employer M/F*

---

# Buy Sell Swap

---

# IFA

**IFA FOR SALE**
**IBM INTEGRATED FILE ADAPTER**
**IBM Feature 4650**
**Cost New $28,320**
**•Replaces Channels 1+4**
**on 370/145**
**•Replaces 2314**
**Control Unit**
**•Supports up to Eight**
**IBM 2314 Spindles**
**Available November 1973**
**Any Reasonable Offer**
**Will be Considered**
**OTIS ELEVATOR CO.**
**30 Glenn Street**
**White Plains, N.Y. 10603**
**Attn: P. Cobin**
**(914) 428-5800**

## FOR SALE
**IBM EQUIPMENT**
085, 407, 514, 519ms, 548, 557, 632
1460 W1 1403 Mod 3
**UNIVAC EQUIPMENT**
1004, 9200, 9300, Fastrand Drums
**SPECIAL**
9200 24K Disc System
**WANTED**
IBM 360-30, all types Univac
Contact: Unit Record Service Co.
84 Cummings Park
Woburn, Mass. 01801
Tel. (617) 938-5340

## FOR SALE
**BY OWNER**
**IBM 3830/3330,**
**8 DRIVES**
**SEPT. 15 DELIVERY**
**L.H. WILLIAMS**
**919-549-8291**

## Available
## Immediately
Honeywell 120-CP
16K 4 tapes
printer, reader
7-ton air conditioner
Excellent Condition
For Details Phone
(904) 358-4040

1400-360
*Specialists in*
1401, 1440
360/20, 360/30
*Hundreds of Satisfied Users*
*Free Appraisal Service*
BUY-TRADE
SELL-LEASE
*Call us last- but Call Us!*
CMI CORP.
Area Code 313-
889-0440
15225 E. Warren
Avenue
Detroit, Mich.
48224

## FOR SALE
**NCR CENTURY**
**DISC PACKS**
**955-1**
**NCR CENTURY**
**CRAM DECKS**
**-5**
**(2) NCR 735-101**
**TAPE ENCODERS**
**(219) 747-1502**

## FOR SALE
**Hewlett – Packard**

- 2 - 2870 A Disc Drives
- 1 - 2871 A Controller
- 1 - 12557A Interface Card
- 1 - 2881 A Power Supply
- 1 - 2882 A Cabinet

Used on H-P 2000C Time Share System

Cliff Doyle
General Time Share, Inc.
3529 Seventh Avenue, South
Birmingham, Alabama 35222
(205) 252-9441

## FOR SALE
**128K Unit Of**
## IBM CORE
**for 360 model 40**
Call or Write
Programming Manager
P.O. Box 44
Wall Street Station
New York, N.Y. 10005
(212) 285-2992

## SURPLUS
## 100 TAPE DRIVES
## $1500 EA.
Units are Ampex TM-7 Read Only. Complete in desk height type cabinet. Various quantities of NRZ and PE configurations. Units sold as is — F.O.B. warehouse.

CW Box 3907
797 Washington St.
Newton, Mass. 02160

## FOR LEASE BY OWNER
2030 F .0 MIC 65K
1403 N-1 1416 HN
1442 C/R/P
2841 2821-1
Available October 1, 1973
Excellent Terms Available
Don't Pass This One Up
Principals Only Contact:
**CITIZENS FINANCIAL CORPORATION**
(216) 692-1800 Mr. John Hall

## IBM 1401 SYSTEMS

| | |
|---|---|
| 4K CARD (C3) | $14,500 |
| 12K CARD (C5) | $21,000 |
| 12K 4 TAPE (C5) | $33,500 |

**Call: (617) 261-1100**
We BUY Any Computer Peripheral or Teletype
Send for FREE Price List
**AMERICAN USED COMPUTER CORPORATION**
P.O. Box 68, Kenmore Station, Boston, Ma. 02215

COMPUTER EXCHANGE

BUY ... SELL ... LEASE
IBM 360/370
For immediate information
call collect:
In the West—(415) 638-9005
In the East—(516) 466-6500

Or write:
8105 Edgewater Dr.
Oakland, CA 94621

11 Grace Ave.
Great Neck, New York 11021

## FOR SALE
NCR C-616 Short Rod
Memory System (16K x 9 Bit)
Priced for quick delivery
## WANTED
**XEROX, DEC &**
**UNIVAC EQUIPMENT**
Complete systems as well
as Peripherals needed.
"1ST SECOND SOURCE
IN DIGITAL EQUIPMENT"

**QUELEX DATA SYSTEMS, INC.**
8740 Shirley Ave.
Northridge, CA 91324
(213) 349-9711
TWX: Quelex Ntge
(910) 493-1243

**Available Immediately**
## 2500's
Sale — Lease — Trade
Contact:
**Don Bell — Vice President**
**Boothe Computer Corp.**
**555 California St.**
**San Francisco, Calif. 94104**
**(415) 989-6580**

## WE WANT TO BUY Teletype® Model's
## 28-33-35
Modems — Couplers — Other Data Communication Equipment
**WE ALSO SELL THE ABOVE**
Call or Write:
DATA COMMUNICATION
EQUIPMENT BROKERS, INC.
1900 Thunderbird Street
Troy, Michigan 48084
(313) 689-2640

## Teletype ®
## Equipment for Sale
**Immediate Delivery**
New — Like New
Models 33, 35, 28 & 32
Call (609) 779-4129

**AVAILABLE**
**IMMEDIATELY**
**900**
**1316-00 Disk Packs**
"As Is" Condition
$20.00 Each
FOB Worcester, Mass.
Will Sell in any Quantities
**(ORDER TODAY)**
Send Order To: H.T.H.
Post Office Box 388
Worcester, Mass. 01613

**DATACASE TAPE STORAGE RACKS**

| | | Quan. Avail |
|---|---|---|
| Double 860 Tapes Seals Thick or Thin | $175.00 | 29M |
| Single 280 Tapes | $105.00 | 19M |
| Wright Line Tape Racks | | |
| Tape Racks For 120 Seals | $80.00 | 7M |
| Tape Seals — Used | | |
| Wright Line 2400 and 1200 Ft. — White | $.78 | 16M |
| Canisters — 2400 Foot | | |
| Thinline — Used 2400 Foot | $.78 | 30M |
| Reels — 2400 Foot | | |
| Like New Aluminum Hubs | $.75 | 15M |
| Good But With Labels | $.50 | 6M |

Call Collect
Temm Ross (713) 772-5887
Computer Accessories
Research Diversified
7878 Bellaire
Houston, Texas 77036

## WE
## WANT TO BUY
Used Burroughs TC-500 Terminals

- any quantity up to 300
- must be covered by Burroughs Maintenance

If you want top price by selling directly to and user, forward detailed specs, availability data and price to:

CW Box No. 3808
797 Washington Street
Newton, Mass. 02160

**WE WILL PURCHASE THE FOLLOWING MACHINES:**
024-026-029 Key Punches
082-083-084 Sorters
548-552-557 Interpreters
087-088-188 Collators
402 and 519
CONTACT VAN PERKINS
CIMARRON EQUIPMENT
LEASING COMPANY
711 THURSTON
NATIONAL BUILDING
TULSA, OKLAHOMA 74103
(918) 584-0073

**Before you Buy**
**-Lease -Sell-**
**360-370-1401-**
All Type IBM
Unit Record Equipment
Please Call or Write
COMPUTER CLEARING CORP
2600 Arroyo, Suite 124
Dallas, Texas 75219
[illegible]

## BUY SELL LEASE
1410 7074 729's
360/50, 512K, Late 73
Honeywell 200 System
Immediate
Systems and Components
Also Teletypes & CRT's

EBM
220 HARVEST AVE
STATEN IS., N.Y. 10310
(212) 273 3636

LDI

SPECIALISTS
IN
370 CORE
3360/003
3360/005

BUY • SELL
TRADE
• LEASE
ANY EDP
EQUIPMENT

Leasing
Dynamics Inc.
3101 Euclid Ave.
Cleveland, Ohio
216-687-0100

## we buy and sell
IBM Computer Systems
& Unit Record Machines
NCR 31-32-33-395-400
Burroughs - L Series

marion
84 Kennedy St.
Hackensack, N.J.
07601
(201) 343-4554

1. IBM 360/30F, Serial #10802
2. IO set with universal character set
3. IBM 360 Model 44 loaded, Serial #11113
4. Features for Model 40: 4457, 4460, 3274, 6981
5. 1401 C3, 1402, 1403

SYSTEMS MARKETING, INC
3930 E. Camelback Road
Phoenix, Arizona 85018
(602) 956 8470

## WANT TO LEASE
## IBM 360/65H
With 2365-2, 1052-7,
2860-3, 2870-1, 1403N1,
2821-1, 2540.
Required by Nov. 1
Minimum of 2 Yrs.
No Brokers Please

Submit Information To:
CW Box 3912
797 Washington Street
Newton, Mass. 02160

## FOR SALE
## OR LEASE
**360/30 COMPLETE SYSTEM**
CORPORATE
COMPUTERS, INC.
420 Lexington Avenue, New York, N.Y. 10017 **(212) 532-1200**

## WHO IS... The Major Financial Institution Leasing S/360's And S/370's in the U.S. Today?

First National Boston (FNB) a top-ranking international financial institution with assets of over $6.3 billion, is now leasing IBM S/360 and S/370 computers and peripherals through an FNB affiliate, Randolph Computer Company. FNB's entry into computer leasing now provides the solid financial base required for highly flexible short and long-term computer leasing of IBM computers and peripherals by IBM users.

During 1972, leasing of S/360 and S/370 CPUs and peripherals saved Randolph's computer-leasing customers over $22 million in rentals ... in just one year. These users of Randolph's computers, who number over 200, are distributed across all of the 12 major U.S. industry sectors, with small firms as well as large corporations sharing in cost-saving leases from Randolph. Financial institutions, too — the professional money managers — are well represented among the EDP users who analyzed financial alternatives, then selected the most flexible lease plan for them: a plan designed by RCC for their changing needs.

For your up-to-date lease plan, contact RANDOLPH, THE COMPUTER LEASING COMPANY, now:

RCC
- 537 Steamboat Rd., Greenwich, CT, 06830 (203) 661-4200
- 5050 Montgomery Rd., Cincinnati, OH, 45236 (513) 793-8060
- 530 "B" St., San Diego, CA, 92101 (714) 232-6401

## 1440 IBM SYSTEM FOR SALE

BK CPU with 1447 console printer
1443 printer
1442 card read/punch
3 - 1311 disk drives

Contact: Gene Chevchek
Lorain National Bank
457 Broadway
Lorain, Ohio 44052
(216) 244-6000

## FOR SALE

**Honeywell** 2201-9 CPU With Features – 0191, 1121, 1117, 1115, 220-3, 286-3, 088, 213-4, 285T, (2) 285-5A, (2) 285-1H, (3) 285-1B

**BIDS ACCEPTED**

Call:
Joe Hnot (516) 466-9500
or Write:
Leasco Computer, Inc.
One Linden Place
Great Neck, New York 11022

## We Need:

1419
MOD 1

BUY
SELL
LEASE

FOR
BETTER
VALUE
LOOK TO:

## Available:

360/50-512K
360/40-64K
360/40-128K
360/40-196K
360/30-32/64K

cac **COMPUTER ACQUISITIONS COMPANY**
P O BOX 80572 ATLANTA GA 30341 • (404) 458 4425

## SYSTEM 360/370

dearborn
computer leasing
corporation

A business relationship you can't afford to be without . . .

- Lease Terms to Fit Your Needs
- Field Engineering Support
- Systems Engineering Support
- Well Trained Marketing Staff
- Buy and Sell-360s
- Subleasing
- Member, Computer Lessors Association

**Dearborn Computer Leasing Corporation**
a subsidiary of Dearborn-Storm
4849 North Scott Street / Schiller Park, Illinois 60176 Area 312 / 671-4410

## BUY·SELL·LEASE

360/20

360
30/40/50
65

370
145/155

1130

## ECONOCOM

Division of Cook Industries, Inc.
2185 Democrat Road – P.O. Box 16902
Mamphis, Tennessee 38116
901-396-8890 or 901-396-8600

## buy·lease·sell

370 & 360 EQUIPMENT

CIS PRESENTS ECONOMY IN IBM HARDWARE and backs it up with an established reputation for service dependability and a penchant for detail. [illegible]

CIS
CONTINENTAL INFORMATION SYSTEMS CORPORATION

## WANTED

TELETYPE® EQUIPMENT
New • Used • Parts
– ALSO –

- Data Terminals
- Peripherals
- Mini-Computers
- Modems

Contact us for data terminal sales, service, supplies and rentals.

Terminal Systems Inc
11300 Hartland St.
N. Hollywood, Calif. 91605
213-799-6772 TWX 910-499-2975

Current Inventory

## SALE

All this Unit Record Equipment in stock and ready to ship at money saving sale or lease prices.

RARELY OFFERED 048, 029, 059, 407, A3, 548, 557, 087, 088
OTHER FINE MODELS 024, 026, 056, 077, 085, 402, 403, 407, 514, 519, 523, 552, 602, 604, 521, 826

D.P. Equipment
Marketing Corp.
260 W. Broadway, N.Y. N.Y.
(212) 925-7737 Ext. 1

## WE BUY • SELL LEASE • RECONDITION

## TELETYPE®

Machines — New, Used

- Models 28, 32, 33, 35, 38
- BRPE's
- CRT's
- Couplers
- Enclosures
- Modems
- 10, 15, 30 CPS Terminals

**NAT'L TELETYPEWRITER CORP.**
23 Cain Dr., Plainview, N.Y. 11803
(516) 293-0444

## WRIGHT LINE

Unitray Trucks for Tab Cards

- 60,000 Card Capacity
- 24 Trays Per Truck
- 53" H X 24" L X 19" W
- 2 Tiers Each Side – On Casters
- Excellent Condition

Cabinet and 24 Trays – $135.00
Trays Only – $4.00 Each

HARDY BRUSH CORP.
16 Haverhill Street
Andover, Massachusetts 01810
Call Collect: (617) 475-4000

## FOR SALE

IBM 407 Data Processing Machine, Maintanance contract, E-6 Model, 40 panels, wires, 3 panel cabinets, and 3 tab card files. $3,500,

(714) 785-2330

General Conference
Insurance Service
P.O. Box 8007
Riverside, California 92505

## IBM 2314

Model 001

Available Sept. 10, 1973

Call or write

Arthur F. Hull
Cincinnati Gas & Electric Co.
P.O. Box 960
Cincinnati, Ohio 45201
513-632-2763

THE
AMERICAN
COMPUTER
EXCHANGE
INC.

## Specialists in IBM 360/370 Purchase & Lease

For Information on the EDP equipment exchange service contact:
Gary Johnston

American Computer Exchange
24500 Chagrin Blvd
Beachwood Ohio 44122
(216) 464 3881

## ACS

FOR SALE or LEASE
1240 — 19K
BANKING SYSTEM
*7335-2 TAPE DRIVE
*1311 DISC DRIVES
*1403-2 PRINTER
*MICR-SORTER RDR.
*SOFTWARE

REFURBISHED —ON IBM M/O
DELIVERED & INSTALLED
AVAILABLE OCT. 73

FOR SALE
1440 — 16K
BANKING SYSTEM
3 — DISC — 1311's
1412 MICR
AVAILABLE THIS FALL

ACS Equipment Corporation
9928 Spring Br[illegible]
Houston, Tx [illegible]
(713) 461-1333

BEFORE YOU BUY

BEFORE YOU SELL

## GO GREYHOUND

**WANTED**
360/65's 360/50's

**FOR SALE**
2030F (1.5 Mic), 2040G, I/O Set, 2314-1, 2314-1's, 1012 Tape Punch.

A member of the Computer Lessors Association

CALL OR WRITE:
Director of Resale Equipment
Greyhound Computer Corporation
Greyhound Towers
Phoenix, Arizona 85077 Phone (602) 248-5972

## ·LEASE · BUY · SELL·

**370**
LEASE PLANS
3 YEARS & LONGER
LOWEST RATES

**360**
PRE-OWNED
EQUIPMENT

THOMAS COMPUTER CORPORATION
625 N. Michigan Ave.
Chicago, Illinois (312) 944-1401

## buy · sell · lease · trade

## 360/370

dataserv equipment inc.

612 546 4422
400 Shelard Plaza, Suite 415
Minneapolis, Minnesota 55426

| SALE OR LEASE | EQUIP. WANTED |
|---|---|
| 360 Systems<br>1401 Systems<br>2400 Tape Drives<br>2311 Disk Drives<br>1620 Systems<br>029, 206, 059<br>All Types Unit Record Equip. Incl. 082, 083, 402, 407, 514, 519, 557 | 360 Systems<br>1401 Systems<br>Tape Drives<br>All Types of Card Equipment<br>029, 059, 026 |

## SPECIAL SALE

360 (30) System
I.O. Set

1620 Disk System
1443 Printer
2311 Disk Drives

1401-8K
729-Tapes

- DPA with offices in most major cities now offers IBM equipment completely reconditioned prior to shipment.
- Member Computer Lessors Assn.
- Call or Write

dpa

D.P.A. INC., 2939 Farrington Street, Dallas, Texas 75207, (214) 637-0990

BUY SELL SWAP

## LEASE OR SALE

IBM 2050 with 3 Selector Channels & 1052 Printer
1 2841 IBM Disc Storege Control
2 2401 IBM Tapes 60,000 BPS
1 Univac 1108 65K System (Avail. the 1st quarter '74)
1 Univac 9200 II 8K Card System
2 Univac 9200 SK Card Systems
1 Univac 1001 Cerd Controller
1 H-200 16K System with 4-204-4-B Tapes
1 H-203A-3 Tape Control & 205-1 Switch

Contact:
A.H. Menchester
53 Ridgewood Avenue
Glen Ridge, N.J. 07028
(201) 748-8159
(212) 233-4885

---

## FOR SALE

[illegible]
360 3 2870
[illegible]
1 2365 [illegible]
[illegible]

CALL or WRITE
Director of Resale Equipment
Greyhound Computer Corp
Greyhound Towers
Phoenix, Arizona 85077
(602) 248 5972

---

## FOR SALE OR LEASE BY OWNER

## UNIVAC 1108

262 K of 750 Nano sec core
4) 432 Drums and Controller
VIII C Tapes and Controller
Multiple Comm. Interfaces
3) Intellegent RJE Terminals

**WILLIAM DIETZ**
1 Linden Plece, Great Neck, L.I., N.Y. 11021 (516) 487-8610

---

Available Today

## BARGAIN MOD 40

128K (all IBM) core, decimal and floating point arithmetic, 2 selector channels, storage protect, and 1052 console

Available for lease from one of our user clients. Call to make us prove that our 12 month rate is the Lowest Price Ever Offered To You for this configuration.

LUNCEFORD & ASSOCIATES
(913) 381 7272

Valley View Bank Bldg
Overland Park, Kan 66212

---

## BUY • SELL • LEASE IBM 360/370

IPS is the oldest dealer in used IBM equipment in tha world. We hava an experianced staff, hundreds of satisfied users, and a stable financial base. IPS carries a multi-million dollar inventory and is always prepared to buy or sall 360 or 370 equipment. On any 360 or 370 purchase, sale, or lease, call or write IPS for a realistic and competitive quota.

IPS

**IPS COMPUTER MARKETING CORP.**
467 Sylvan Avenue,
Englewood Cliffs,
New Jersey 07632
(201) 871-4200,
TWX (710) 991-9677

---

## Evergreen Computer and Financial, Inc.

HOME OFFICE
Suite 120
9100 Bloomington Freeway West
Bloomington, Minnesota 55431
612/884 9751

BRANCH OFFICES
2720 Des Plaines Avenue
Des Plaines, Illinois 60018
312 298 7890

312 East Wisconsin Ave
Milwaukee, Wisconsin 53202
414/276 0909

2040 G CPU (SN 21353)
3237 DECIMAL ARITHMETIC
4427 FLOATING POINT
6980 FIRST SELECTOR CHANNEL
7520 STORAGE PROTECTION
7920 1052 ADAPTER
1052-7 PRINTER-KEYBOARD (SN 50546)

ATTRACTIVE 370 LEASE RATES AVAILABLE

---

## For Sale

## IBM LCS

## 2361-II

WRITE:

CW Box 3909
797 Washington Street
Newton, Mass. 02160

---

## DISK PACKS ALL TYPES ALL MANUFACTURERS

We also sell and lease new and recertified disk packs.

Used Computers, Inc.
14 S. Bryn Mawr Ava.
Bryn Mawr, Pa. 19010
(215) 525-4456

---

## SALE/LEASE

### 360/20's

C1-8K, 1403-7, 2560 A-1
D2-16K, 1442-5, 2501 A-1 – 1403-2
(2) 2311-11, 2415-1
OTHER MODELS AVAILABLE
1401 C 3, 1402-1, 1403-2
360/30's, 40's, 50's with I/O sets
370-145's, 155's

### BUY

All model 360/20's, 360/30's, 40's, 50's and 65's
370's and System 3's
All peripherals and unit record equipment

CROSS COMPUTER CORPORATION

360/370 & SYSTEM 3
FINANCING AVAILABLE
PHILAOELPHIA (215) 566-6620
NEW YORK (516) 487-9812
505 Northarn Blvd.
Great Neck, N.Y. 11021

---

COMPUTRADE, INC.
BOX 34072
WASHINGTON, D. C. 20034
(301) 299-4510

TELEX 89-5442

---

## WANTED

BURROUGHS
L SERIES
TC 500 A149, A150
NCR 31-32
42 On Line

I.O.A. Data Corp.

---

## THE CLC CORNER

COMPUTER LEASING COMPANY
OFFERS FOR SALE, RENTAL OR LEASE

## CDC 6400 & 6600

COMPLETE WITH DESIRED PERIPHERALS

**Low purchase prices**—Buy now, or epply generoue rentel credite towerd purchese.

**Economicel rentel/leese plens**—Terme lo fil your needs, from month-to-month lo live yeers; unlimited usege; meintenence end ineurence peid by CLC.

**Superior quelity**—Like-new condilion; continued meintenence guerenteed.

CALL (703) 521-2900

Ask Heyden Willieme for name ol selee repreeentetive neerest you
Ths men who knsw thsir businsss get thsir computieg equipmeet from . . .

CLC Computer Leasing COMPANY

2001 Jefferson Devis Highwey, Arlington, Ve. 22202 • Offices Netionwids

---

---

## 360·370 marketplace

BUY • SELL • LEASE

BRANCH OFFICE:
222 E. Wisconsin Ave
Lake Forest, Ill. 60045
(312) 295-2030

TLW COMPUTER INDUSTRIES INCORPORATED

BRANCH OFFICE:
3031 Tisch Way
Executive Suite 13
San Jose, Calif. 95128
(408) 249-0110

3570 AMERICAN DRIVE • ATLANTA, GEORGIA 30341 • 404/451-1895

---

## FOR LEASE OR SALE

360 - 30 - F - 15405
1051- N1 - 61582
1052- 6 - 61620

360 - 30 - F - 16294
1051- N1 - 52530
1052- 8 - 66350
2821- 01 - 16174
2540- 01 - 11789
1403- N1 - 36799

1401- E5 - Tape & Oisk System
1401- C6 - Tape Systam

029 - B-22's
059 - 02

| | |
|---|---|
| Sale- 1316- Oisk Packs- $20.00 | Lease- $4.00 Month |
| Sale- 2315- Oisk Packs- $35.00 | Lease- $5.00 Month |
| Sale- 2316- Oisk Packs- $75.00 | Lease- $7.50 Month |

## WANTED

360 - 20 - Card System
557's 1403-N1
088's 2540-01
129's 2821-01

DATA AUTOMATION SERVICES, INC.
4858 Cash Road
Dallas, Texas 75247
(214) 637-6570

## BUY SELL SWAP

### SALE or LEASE

Short Term Rentals
Also Available
IBM 047
026 – 05
Receiving Punch
With or Without 1001's
082, 552, 514, 026, etc.

Computer Resale
Exchange Inc
[illegible]

### ACS

HONEYWELL
1200 – 32K
4 – TAPE
2 – DISC
AVAILABLE NOW
PRICED TO MOVE!!
FOR SALE or LEASE
or LEASE/PURCHASE

ACS Equipment Corporation
8928 Spring Branch Drive
Houston, Tx 77055
(713) 461 1333

### MAGNETIC TAPE

| 1600 BPI | 800 BPI | |
|---|---|---|
| | recertified | uncertified |
| 2400 | $6.00 | $3.50 |
| 1200 | 5.00 | 3.00 |
| seals | thinline | thickline |
| IBM | Memorex | Scotch |

* released from
GEOPHYSICAL Archives
not work tapes
(713) 772-5557
C.A.R.D.
7575 Bellaire Blvd.
Houston, Texas 77036

### data sales co.

BUY • SELL • LEASE
IBM 360/370
SYSTEM 3 MEMORY

Call or Write
13200 Penn. Ave. [illegible]
Burnsville, Minn. 55337
(612) 890-8838

### FOR SALE OR LEASE

024-$350; 026-$1300; 056-$250; 077-$550; 082-$1,000; 083-$2900; 085-$1800; 088-$6200; 402-$1300; 403-$1500; 407-$3500; 514-$1300; 519-$1600; 548-$2300; 552-$1500; 557-$3700; 602-$400; 2311 (1) $5000; 729 (6) $2500; 729 (6) $3000; 1448 (1) $1000; 1401 systems $17,500 & $35,000.

THOMAS COMPUTER CORP.
625 N. Michigan-Suite 500
Chicago, Ill. 60611
(312) 944-1401

### FOR SALE OR LEASE

IBM 1401
4K to 16K Systems
with or without
Tape Drives & Disks
Savings in thousands.

D.P. Equipment
Marketing Corp.
260 W. Broadway, N.Y. N.Y.
CALL (212) 925-7737 Ext. 1

## MOVING?

Please notify *Computerworld* at least four weeks in advance. When writing about your subscription, please enclose a recent mailing label. The code line on top may not mean much to you, but it is the only way we have of quickly identifying your records. If you are receiving duplicate copies, please send both labels.

797 Washington Street
Newton, Massachusetts 02160

## BUY SELL SWAP

### 360 • BUY • SELL • TRADE • 370

• LEASE SUBLEASE •

### FOR SALE

COMPLETE SYSTEM
360/30 64K 2 Channels
1403-N1 PRINTER & 2821-2
2501-B2 1000 CPM READER
2314-A1 6 SPINDLES (Sept.)
4-90KB TAPES & CONTROL
AVAILABLE NOW
OPTIONAL CONFIGURATIONS
AVAILABLE

LUNCEFORD & ASSOCIATES
Valley View Bank Bldg
Overland Park Kan 66212
(913) 381 7272

## Time for Sale

### NEW JERSEY

### -WANTED-

APPLICATIONS PROGRAMS

We have 360/40 OS partitions available connected to nationwide dial-up communications network. May be better and cheaper than time-sharing for you.

Call or Write:

Bill Brown
(201) 569-7711
Graphic Scanning Corp.
99 W. Sheffield Avenue
Englewood, N.J. 07631

### POPULAR SERVICES, INC.

S/370 145-135-125
S/360 50- 40- 30

1287 OPTICAL SCANNER
2671 PAPER TAPE READER

ALL SHIFTS
(201) 471-2577

### ILLINOIS

IBM 360/370 USERS
Computer Time Available

**370/155** 2.0 MEG, 8 3330's, 2 2314's, 10 3420 Tapes, RJE, BATCH, TSO

24 Hours—7Days

CAN YOU BEAT?
7.2 cents/sec for a 60K region?

**360/65** 1.5 MEG, 4 3330's 2 2314's 10 3420 Tapes

| | 8am—8pm | 8pm—8am |
|---|---|---|
| Weekdays | Not Avail | $95/hr. |
| Weekends | $60/hr. | $50/hr. |
| 12 hr. block weekend | $50/hr. | $40/hr. |

**370/135** 144k, 1 2314, 4 2311, 6 3420-5 Tapes

| | 8am—8pm | 8pm—8am |
|---|---|---|
| Weekdays | $85/hr. | $55/hr. |
| Weekends | $40/hr | $35/hr. |
| 12 hr. block weekend | $35/hr. | $30/hr. |

**370/135** 240K, 4 3330's, 1 2314, 6 2401-6 Tapes
Rates same as 370/135 above.

**360/30** 64K, 8 2401 Tapes, 5 2311's

| | 8am—8pm | 8pm—8am |
|---|---|---|
| Weekdays | $45/hr. | $35/hr. |
| Weekends | $25/hr. | $25/hr. |

FOR FURTHER INFORMATION CALL PAUL SARRIS or RON ELLIS (312) 348-1331

computer research company
200 N. Michigan Ave.
Chicago Ill. 60601

Largest Computer
Time Sales Company

## TIME FOR SALE

### ILLINOIS

### NEED TIME

360/65 DOS 512 K
with 7080 Emulator
12 Tape Drives
16 2314 Disk Drives
On and Off
Line Printers
Interested in Selling Block Time
Five or Seven Days a Week
Located in Chicago Central
Business District
Excellent Physical Facilities
Will Provide Office & Storage
Call (312) 225-6800, Mr. Zimmer

### COMPUTER TIME AVAILABLE

Continental Can Company, Inc.
36 South Wabash
Chicago, Ill. 60603

| | |
|---|---|
| 370/145 | 384K |
| 4-2402 | Tape Drives |
| 8-3330 | Disk |
| 2-1403 | Printer |
| 1-2540 | Card Reader/Punch |

Run under DOS V/M

Call D.A. Dalstrom
(312) 269-8666

### MASSACHUSETTS

systematic data processing services, inc.

IBM 370/155
DATA CENTER
OS MVT Release 21.6
1500K Main Storage
3330 and 2314 Disks
HASP III Remote Job Entry
Private Client Offices
Customer Systems Support
Courier Service
Key Punching Services
24 hours a day, 7 days a week
Call Sales Dept. 890-1200
SDPS
400 Tottan Pond Road
Waltham, Mass. 02154

### CONNECTICUT

COMPUTERISTICS
SUBSIDIARY OF
UNIROYAL
COMPUTER PROCESSING
SERVICES
360/65 • 1256K • OS
HASP RJE
360/50 360/40 360/30
BATCH PROCESS
Call Collect:

| | |
|---|---|
| Cal Gould | (203) 573-3000 |
| George Errico | (203) 573-2507 |

## Software for Sale

### TAXBREAK

•••

Payroll tax calculation module

Calculates payroll withholding taxes for 50 states, federal, FICA and cities. COBOL. $875 complete.

Maintenance service on tax changes available for $225 per year.

ARGONAUT INFORMATION
[illegible]

## SOFTWARE FOR SALE

### MMS GENERAL LEDGER

is hard at work
for over 70
of the biggest
US corporations*
TO FIND OUT
WHAT THEY KNOW
THAT YOU DON'T,
CALL:

| | |
|---|---|
| New York | 212-972-9540 |
| Chicago | (312) 729-7410 |
| Atlanta | 404-255-0039 |
| Los Angeles | (213) 437-3301 |

Software
International
Corporation
2 Elm Square
Andover, Mass. 01810
(617) 475-5040

*so are Accounts Receivable, Accounts Payable, Inventory Management packages.

### CATS-A/R

OPEN ITEM
ACCOUNTS RECEIVABLE

Features Include:
*Billing
*Automatic Cash Application
*Inventory Interface
*Multi-company Systems Schedule

Under control of the CATS MASTER Systems Controller, provided FREE with the license of any of the CATS programs. Also available are: Accounts Payable-Cash Requirements, Accounts Receivable—Retail System, and Inventory Recordkeeping.

For information contact:
Tom Leopard, President
COMPUTERWARES INTERNATIONAL
P.O. Box 31205, Birmingham
Ala. 35222 - Phone 205/592-6381

### Paymaster Remedies Payroll Problems

- a comprehensive payroll system
- now serving over 1000 companies
- license for as low as $250 a month
- up to 20 customized deductions and/or allowances . . . all with Y-T-D totals
- handles piecework, including calculations of make-up pay
- accepts input from time cards
- accepts input from terminals
- integrated job costing
- labor distribution
- integrates personnel/payroll records
- completely compatible with "Honeywell 200 batch" and "IBM 360/370 batch and remote job entry."
- available to companies, institutions and service firms under licensing or purchase

COMTECH
*the computer package people*
P.O Box 784 Reston, Va., 22070
Telephone (703) 471-7141

## SOFTWARE FOR SALE

### AUTOCODER & SPS TRANSLATED AUTOMATICALLY to BAL & PL/1

THE TOTALTRAN SYSTEM

. . . The most economical, practical and quickest method of converting to the 3rd and 4th generation.

3 SERVICES OFFERED:

1. 1400 Object to clean source decompilation
2. 1400 Clean source to BAL. translation
3. 1400 Clean source to PL/1 translation

Contact: W. Small, President

CPU
CPU MANAGEMENT
ADVISORY CORP
[illegible] N.Y. 100[illegible]
(212) 777-7722

### ACCOUNTING IV

THE FINEST
GENERAL LEDGER
AND FINANCIAL
REPORTING
SYSTEM
AVAILABLE

Featuring:
- Conventional Report Generator
- Graphic Report Generator
- Matrix Report Generator
- Responsibility Reporting
- Flexible Budgeting Module
- Multiple Currency Version to accommodate foreign subsidiary accounting

informatics inc

Contact: Ron Kupferman
65 Route 4
River Edge, [illegible]
New York (212) 964-1258
New Jersey (201) 488 2100

### ACCOUNTING SYSTEMS

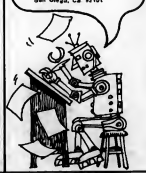
- Accounts Receivable
- Accounts Payable
- General Ledger
- Fixed Asset
- Sales Analysis
- Report Writer

More than 80 companies are successfully and profitably using these valuable management tools. For immediate information, call collect to the office nearest you.

INFONATIONAL

| | |
|---|---|
| Chicago | 312/332-6738 |
| Dallas/Ft. Worth | 817 732-6603 |
| Los Angeles | 213/383-4191 |
| New York | 212/489-1660 |
| San Diego | 714/238-6344 |

1118 Sixth Avenue
San Diego, Ca. 92101



* WANTED *

Firms to: Buy, Sell, Lease, Sub-Lease → 360 Systems

Write or Call Collect — Today
Its our only business

NVC COMPUTER SALES, INC.
Suite 616, Benjamin Fox Pavilion
Jenkintown, Pa. 19046 • (215)-887-5404

*McCormack & Dodge Corporation*

Has

DEVELOPED
MARKETED
MAINTAINED

Accounting-oriented software products over the past five years.

Over 400 companies in the U.S. are using one or more of the following:

Fixed Asset Analysis & Accounting System
Accounts Receivable System
Investment Analysis System

*McCormack & Dodge Corporation*

One Wells Avenue
Newton, Massachusetts 02159
(617) 965-3750

### *Cites Decline in Sales to Lessors*

# Telex Posts $13.4 Million Loss for Year

TULSA, Okla. – Telex Corp. incurred a $13.4 million loss for the year ended March 31, and cited as a major factor the lower level of sales to leasing companies by the Computer Products subsidiary.

Sales by the unit totaled $8.2 million compared with $31.7 million in 1972. However, the sales value of equipment placed with customers during the year rose to $98.1 million from $60.3 million the year before.

Other factors contributing to the loss included a $4.5 million loss from European operations and year-end adjustments in the Computer Products subsidiary, according to President S.J. Jatras.

The $13.4 million loss compares with earnings of $1.3 million or 12 cents a share in 1972.

Revenue during the recent year dropped to $68.1 million from $73.9 million.

Lease income for the year totaled $12.5 million compared with $9.7 million a year ago. "This increase reflects in part the reduced level of leasing company sales," the company said.

Telex Communications, Inc., organized as a wholly owned subsidiary effective July 1, and Waters Conley Co., which originally comprised the Telex Communications Group, reported increased revenues and profits, the firm said.

Revenues reached $23.3 million compared with $22.9 million last year.

As of March 31, Telex had orders for sale or lease of equipment having a sales value of $27.2 million compared with $43.1 million a year ago, the firm said.

# *Record Fourth Quarter Paces DEC To Banner Year, Earnings up 54%*

MAYNARD, Mass. – Digital Equipment Corp.'s record fourth quarter paced the company to its best fiscal year, with earnings climbing 54% on a 42% income rise in the year ended June 30.

Minicomputer shipments reached their highest level during the last quarter and shipments exceeded 1,000 units per quarter in the PDP-8 and PDP-11 families, lifting total installations to over 25,000, the company said.

A major portion of the demand was attributed to the OEM market. Other strong areas were data communications, industrial and laboratory, the firm said.

The large Decsystem-10 further strengthened its position in the time-sharing utility, commercial and educational markets during the year, DEC said.

"We see continued growth for the Decsystem-10 and expect it to be a major product line for the foreseeable future," commented President Kenneth H. Olsen.

In the quarter, earnings rose 53% to $9.3 million or 85 cents a share compared with $5.1 million or 49 cents a share in the same 1972 period.

Revenues reached $86.3 million compared with $56.5 million a year ago.

For the year, earnings totaled $23.5 million or $2.16 a share compared with $15.3 million or $1.49 a share in 1972.

Revenues rose to $265.5 million from $187.6 million in 1972.

During the year, Digital hired more than 5,000 manufacturing, field service and administrative personnel, bringing worldwide employment to about 13,000, Olsen said.

# Itel Half, Quarter Show Earnings

SAN FRANCISCO – Bolstered by a strong second quarter, Itel Corp. reported earnings in both the quarter and the half compared with losses in the year-ago periods.

President Peter S. Redfield said he expects the largest portion of Itel's operating revenues will come in the second half of the year.

In the quarter, earnings rose to $1.8 million or 23 cents a share compared with a loss of $1.3 million or 17 cents a share in the year-ago period.

Revenues more than doubled to $44.1 million from $20.1 million in the previous year's quarter.

In the six months, earnings rose to $2.5 million or 33 cents a share compared with a loss of $2.8 million or 38 cents a share in the same 1972 period.

Revenues reached $77.4 million compared with $39.6 million.

"These results reflect the strong operating momentum that has been built up throughout the company since late 1972," Redfield observed, adding, they do not reflect the agreement to sell the Information Storage Systems Division to Univac.

During the second quarter Itel formed a new subsidiary, called SSI Navigation, Inc., a ship operating and chartering company.

# *ADR Revenues, Net Rise in Six Months*

PRINCETON, N.J. – Applied Data Research, Inc. scored record revenues and improved earnings for the six months ended June 30.

The company has shown improved profits for the last three consecutive quarters, according to President John R. Bennett. In each of these periods, software product sales exceeded $1 million, he noted.

Earnings for the half year climbed to $136,527 or 12 cents a share compared with $94,103 or 10 cents a share in the same 1972 period, which has been reclassified.

Revenues reached $5.1 million, up from $4.4 million in the year-ago period.

# *Acquisitions*

Tektronix Inc. has agreed to acquire Grass Valley Group Inc., supplier of television line and terminal equipment, for about 500,000 shares of Tektronix common.

**Commerce Clearing House, Inc. (CCH) and its majority-owned subsidiary, Computax Services, Inc., have agreed in principle to a merger of Computax into CCH. Terms of the agreement call for the issuance of 330,150 shares of CCH common in exchange for the 660,300 shares of Computax common not presently held by CCH.**

Itel Corp. has agreed in principle to acquire D.C.S. Computer Services, a New York-based service company, for an undisclosed amount of cash.

**Penril Data Communications, Inc. has reached an agreement to acquire substantially all of the business and assets of the Electro-Metrics Division of Fairchild Camera and Instrument Corp. for an undisclosed amount of cash.**

Scientific Software Corp. and Brooks Monroe and Co., Inc. have reached general agreement for the sale of Education and Economic Systems, Inc. to Brooks Monroe.

**Control Data Corp. has acquired the operating assets and business of Greenwich Data Systems, Inc., a wholly owned subsidiary of Planning Research Corp., Los Angeles, for an undisclosed price.**

On-Line Services

Expand your business using our Dual DEC System-10 with nation-wide dial access as your own computer center supporting your applications and customer base.

**We offer:**

- Attractive rates
- Your own custom sign-on message
- Protected group libraries
- Technical support
- Flexible business terms

Do you have an on-line application package looking for a distribution vehicle?

Do you have a batch application suitable for on-line use?

Does your company perform a computarized function which may be of interest to others in your industry?

**For details, write:**

Teleplex Marketing Manager
**APPLIED DATA RESEARCH**
Route 206 Center, Princeton, New Jersey 08540
Telephone: (609) 921-8550

# Earnings Reports

### CINCINNATI MILACRON
Three Months Ended June 16

| | 1973 | 1972 |
|---|---|---|
| Shr Ernd | $.61 | $.05 |
| Revenue | $6,105,482 | 64,174,916 |
| Earnings | 2,265,019 | 244,050 |
| 6 Mo Shr | 1.16 | ..... |
| Revenue | 168,428,339 | 123,210,587 |
| Earnings | 4,309,334 | (130,444) |

### SCIENTIFIC COMPUTERS
Nine Months Ended March 31

| | 1973 | 1972 |
|---|---|---|
| Shr Ernd | $.13 | $.16 |
| Revenue | 2,802,061 | 2,667,425 |
| Earnings | 106,112 | 129,944 |

### MACRODATA
Six Months Ended June 30

| | 1973 | 1972 |
|---|---|---|
| Shr Ernd | $.37 | $.32 |
| Revenue | 3,442,584 | 2,347,090 |
| Earnings | 293,146 | 200,926 |

### SINGER
Three Months Ended June 30

| | 1973 (000) | 1972 (000) |
|---|---|---|
| Shr Ernd | $1.21 | $1.04 |
| Revenue | 619,745 | 552,271 |
| Earnings | 21,469 | 19,311 |
| 6 Mo Shr | 2.39 | 2.05 |
| Revenue | 1,196,531 | 1,077,131 |
| Earnings | 42,415 | 38,026 |

### DATA 100
Three Months Ended June 30

| | 1973 | a1972 |
|---|---|---|
| Shr Ernd | $.25 | ..... |
| Revenue | 9,437,000 | $2,195,000 |
| Tax Cred | 347,000 | ..... |
| Earnings | 722,000 | (1,567,000) |
| 6 Mo Shr | .42 | ..... |
| Revenue | 17,091,000 | 3,782,000 |
| Tax Cred | 579,000 | ..... |
| Earnings | 1,226,000 | (3,938,000) |

a-Restated for accounting changes.

### DOCUTEL
Three Months Ended June 30

| | 1973 | 1972 |
|---|---|---|
| Shr Ernd | $.50 | $.16 |
| Revenue | 10,770,000 | 4,914,000 |
| Tax Cred | 1,155,000 | 322,000 |
| Earnings | 2,428,000 | 693,000 |
| 6 Mo Shr | .93 | .24 |
| Revenue | 19,605,000 | 9,232,000 |
| Tax Cred | 2,204,000 | 498,000 |
| Earnings | 4,554,000 | 1,046,000 |

### RAPIDATA
Three Months Ended June 30

| | 1973 | 1972 |
|---|---|---|
| Shr Ernd | $.11 | e$.14 |
| Revenue | 2,248,191 | 2,014,744 |
| Earnings | 206,901 | 264,376 |
| 6 Mo Shr | .27 | e.24 |
| Revenue | 4,552,721 | 3,718,510 |
| Earnings | 498,284 | 452,735 |

e-Adjusted for two-for-one stock split in June 1972.

### STANDARD REGISTER
Three Months Ended July 1

| | 1973 | a1972 |
|---|---|---|
| Shr Ernd | $.57 | $.44 |
| Revenue | 31,214,791 | 27,095,854 |
| Spec Cred | ..... | b128,889 |
| Earnings | 1,242,640 | 953,378 |
| 6 Mo Shr | 1.04 | .71 |
| Revenue | 60,315,776 | 53,044,451 |
| Spec Cred | ..... | b128,889 |
| Earnings | 2,246,076 | 1,528,765 |

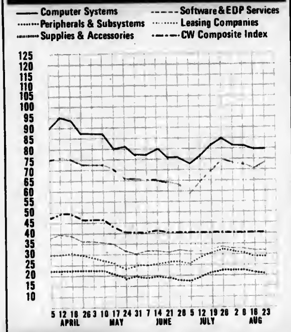
a-Restated. b-Gain on sale of property.

### WANGCO
Three Months Ended June 30

| | 1973 | 1972 |
|---|---|---|
| Shr Ernd | $.27 | $.21 |
| Revenue | 2,911,383 | 1,277,772 |
| Tax Cred | ..... | 93,605 |
| Earnings | 295,274 | 187,392 |
| 9 Mo Shr | .74 | .34 |
| aSpec Cred | 63,300 | 100,105 |
| Earnings | 792,972 | 264,544 |

a-In 1973, tax credit; in 1972, tax credit less loss from discontinuance of subsidiary.

COMPUTERWORLD Computer Stocks Trading Indexes



360 LEASE 370
IBM Computer Systems & Unit Record Machines
BUY
SELL
LEASE PLANS
3 YEARS&LONGER
LOWEST RATES

you owe it to your company to get the lower Datronic quote.

datronic

5210 Wesley Terrace
Chicago, Ill. 60656
Phone Area 312-922-0760

STORE MORE. PAY LESS.

IBM 3360's
More storage for your 370/155 or 370/165 at much less cost. Lease 1 to 5 years or purchase. Delivery guaranteed to meet your specific needs.

alanthus

Alanthus Corporation
77 Tarrytown Road
White Plains, New York 10607

For further information, call (914) 428-3703 or write:
Name
Title
Company
Address
City
State Zip
Phone No.

# Computerworld Stock Trading Summary

All statistics compiled, computed and formatted by TRADE★QUOTES, INC. Cambridge, Mass. 02139

### COMPUTER SYSTEMS

| EXCH | | PRICE 1973 RANGE (1) | CLOSE AUG 23 1973 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| N | BURROUGHS CORP | 211-245 | 223 7/8 | - 7/8 | -0.3 |
| N | COLLINS RADIO | 16- 28 | 25 1/8 | + 3/8 | +1.5 |
| O | COMPUTER AUTOMATION | 5- 16 | 9 3/4 | -1 1/8 | -10.3 |
| N | CONTROL DATA CORP | 31- 62 | 35 3/8 | +1 3/4 | +5.2 |
| O | DATA GENERAL CORP | 28- 46 | 38 3/4 | +1 1/4 | +3.2 |
| O | DATAPOINT CORP | 10- 21 | 9 3/4 | - 1/4 | -2.5 |
| O | DIGITAL COMP CONTROL | 2- 6 | 2 3/4 | - 1/2 | -15.3 |
| N | DIGITAL EQUIPMENT | 73-105 | 88 5/8 | - 3/4 | -0.8 |
| N | ELECTRONIC ASSOC. | 4- 8 | 4 3/8 | - 1/4 | -5.4 |
| A | ELECTRONIC ENGINEER. | 6- 11 | 8 3/8 | - 1/4 | -2.5 |
| N | FOXBORO | 23- 36 | 35 1/2 | - 7/8 | -2.4 |
| O | GENERAL AUTOMATION | 22- 55 | 33 | - 1/4 | -0.7 |
| O | GRI COMPUTER CORP | 1- 3 | 1 3/8 | + 1/8 | +10.0 |
| N | HEWLETT-PACKARD CO | 73- 95 | 77 3/4 | -3 | -3.7 |
| N | HONEYWELL INC | 88-138 | 105 | + 7/8 | +0.8 |
| N | IBM | 298-340 | 299 1/4 | -1 1/4 | -0.4 |
| O | INTERDATA INC | 7- 13 | 8 | 0 | 0.0 |
| N | MEMOREX | 2- 18 | 4 7/8 | 0 | 0.0 |
| O | MICRODATA CORP | 2- 10 | 2 3/4 | - 1/4 | -8.3 |
| N | NCR | 27- 36 | 34 1/2 | + 1/4 | +0.7 |
| N | RAYTHEON CO | 22- 34 | 25 1/4 | + 7/8 | +3.5 |
| N | SINGER CO | 45- 74 | 48 | -2 7/8 | -5.6 |
| N | SPERRY RAND | 36- 50 | 47 7/8 | +2 3/8 | +5.2 |
| A | SYSTEMS ENG. LABS | 3- 8 | 3 1/2 | 0 | 0.0 |
| N | TEXAS INSTRUMENTS | 83-110 | 103 5/8 | +2 1/2 | +2.4 |
| O | ULTIMACC SYSTEMS INC | 1- 11 | 3 | 0 | 0.0 |
| N | VARIAN ASSOCIATES | 10- 20 | 12 3/8 | - 1/8 | -1.0 |
| N | WANG LABS. | 13- 34 | 19 3/8 | -1 7/8 | -8.8 |
| N | XEROX CORP | 141-188 | 150 1/8 | - 1/8 | 0.0 |

### LEASING COMPANIES col1

| EXCH | | PRICE 1973 RANGE (1) | CLOSE AUG 23 1973 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| A | BOOTHE COMPUTER | 1- 5 | 1 1/8 | - 1/8 | -10.0 |
| O | BRESNAHAN COMP. | 1- 2 | 2 | 0 | 0.0 |
| O | COMDISCO INC | 6- 17 | 6 1/4 | - 1/2 | -7.4 |
| O | COMMERCE GROUP CORP | 3- 4 | 3 1/2 | 0 | 0.0 |
| O | COMPUTER EXCHANGE | 1- 1 | 1/4 | - 1/4 | -50.0 |
| A | COMPUTER INVSTRS GRP | 2- 8 | 2 5/8 | - 1/8 | -4.5 |
| O | COMP. INSTALLATIONS | 1- 2 | 1 | 0 | 0.0 |
| M | DATRONIC RENTAL | 2- 3 | 2 1/4 | + 1/4 | +12.5 |
| A | DCL INC | 1- 3 | 1 | - 1/8 | -11.1 |
| A | DEARBORN-STORM | 12- 26 | 14 1/2 | -2 3/4 | -15.9 |
| N | DPF INC | 5- 8 | 4 7/8 | - 3/8 | -7.1 |
| O | EDP RESOURCES | 1- 3 | 1 1/2 | - 1/8 | -7.6 |
| A | GRANITE MGT | 2- 6 | 2 3/4 | - 1/2 | -15.3 |
| A | GREYHOUND COMPUTER | 3- 6 | 3 3/4 | - 1/8 | -3.2 |
| A | ITEL | 4- 12 | 4 7/8 | - 1/8 | -2.5 |
| N | LEASCO CORP | 8- 18 | 10 1/2 | - 1/4 | -2.3 |
| O | LEASPAC CORP | 2- 8 | 2 1/8 | - 3/8 | -15.0 |
| O | LECTRO MGT INC | 1- 2 | 1 1/4 | 0 | 0.0 |
| O | NRG INC | 5- 15 | 4 3/4 | + 1/8 | +2.7 |
| A | PIONEER TEX CORP | 5- 8 | 4 5/8 | 0 | 0.0 |
| A | ROCKWOOD COMPUTER | 1- 3 | 1 1/8 | - 1/8 | -10.0 |
| N | U.S. LEASING | 18- 36 | 21 1/8 | - 1/4 | -1.1 |

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

### SOFTWARE & EDP SERVICES

| EXCH | | PRICE 1973 RANGE (1) | CLOSE AUG 23 1973 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| O | ADVANCED COMP TECH | 1- 2 | 1 1/4 | - 1/4 | -16.6 |
| A | APPLIED DATA RES. | 2- 4 | 2 | 0 | 0.0 |
| O | APPLIED LOGIC | 1- 3 | 7/8 | + 3/8 | +75.0 |
| N | AUTOMATIC DATA PROC | 39- 94 | 58 1/4 | +2 3/4 | +4.9 |
| O | BRANDON APPLIED SYST | 1- 1 | 1/4 | 0 | 0.0 |
| O | CENTRAL DATA SYSTEMS | 6- 8 | 6 1/4 | 0 | 0.0 |
| O | COMPUTER DIMENSIONS | 2- 5 | 2 1/4 | 0 | 0.0 |
| O | COMPUTER DYNAMICS | 1- 2 | 3/8 | 0 | 0.0 |
| O | COMPUTER HORIZONS | 1- 4 | 3 | + 1/2 | +20.0 |
| O | COMPUTER NETWORK | 1- 5 | 1 | 0 | 0.0 |
| N | COMPUTER SCIENCES | 2- 8 | 3 1/4 | + 1/8 | +4.0 |
| O | COMPUTER TASK GROUP | 1- 2 | 1 1/2 | 0 | 0.0 |
| O | COMPUTER TECHNOLOGY | 1- 3 | 1 | 0 | 0.0 |
| O | COMPUTER USAGE | 4- 8 | 5 3/8 | 0 | 0.0 |
| O | COMRESS | 1- 2 | 3/8 | 0 | 0.0 |
| O | COMSHARE | 4- 8 | 4 3/4 | + 1/4 | +5.5 |
| N | CORDURA CORP | 4- 15 | 4 | - 3/4 | -15.7 |
| O | CYBERMATICS INC | 1- 3 | 1 3/8 | - 1/8 | -8.3 |
| O | DATATAB | 2- 4 | 1 3/8 | 0 | 0.0 |
| A | ELECT COMP PROG | 1- 2 | 1 1/4 | + 1/8 | +11.1 |
| N | ELECTRONIC DATA SYS. | 28- 56 | 33 3/4 | -1 1/4 | -3.5 |
| O | INFONATIONAL INC | 1- 2 | 1/4 | - 1/8 | -33.3 |
| O | INFORMATICS | 2- 6 | 4 1/8 | 0 | 0.0 |
| O | I.D.A. DATA CORP | 1- 1 | 5/8 | 0 | 0.0 |
| O | IPS COMPUTER MARKET. | 1- 5 | 1 1/8 | + 1/8 | +12.5 |
| O | KEANE ASSOCIATES | 3- 4 | 3 1/2 | - 1/4 | -6.6 |
| O | KEYDATA CORP | 6- 12 | 6 1/4 | + 1/8 | +2.0 |
| O | LOGICON | 3- 7 | 3 1/2 | 0 | 0.0 |
| A | MANAGEMENT DATA | 2- 5 | 1 7/8 | 0 | 0.0 |
| O | NATIONAL CSS INC | 18- 42 | 24 | +3 | +14.2 |
| O | NATIONAL COMPUTER CO | 1- 1 | 3/8 | 0 | 0.0 |
| O | NATIONAL INFO SRVCS | 1- 2 | 1/2 | - 1/8 | -20.0 |
| P | ON LINE SYSTEMS INC | 12- 17 | 16 3/4 | + 3/8 | +2.2 |
| N | PLANNING RESEARCH | 2- 7 | 3 | - 3/8 | -11.1 |
| O | PROGRAMMING METHODS | 21- 25 | 21 | -1 | -4.5 |
| O | PROGRAMMING & SYS | 1- 1 | 7/8 | 0 | 0.0 |
| O | RAPIDATA INC | 5- 24 | 8 1/2 | 0 | 0.0 |
| O | SCIENTIFIC COMPUTERS | 1- 3 | 5/8 | - 1/8 | -16.6 |
| O | SIMPLICITY COMPUTER | 1- 4 | 1 1/2 | 0 | 0.0 |
| O | 7RS COMPUTER CENTERS | 2- 4 | 1 3/4 | 0 | 0.0 |
| O | TCC INC | 1- 1 | 1/4 | - 1/8 | -33.3 |
| O | TYMSHARE INC | 8- 12 | 8 1/2 | - 1/8 | -1.4 |
| O | UNITED DATA CENTER | 4- 4 | 3 3/4 | 0 | 0.0 |
| A | URS SYSTEMS | 4- 8 | 3 7/8 | - 1/4 | -6.0 |
| N | WYLY CORP | 4- 11 | 5 | - 1/4 | -4.7 |

### PERIPHERALS & SUBSYSTEMS

| EXCH | | PRICE 1973 RANGE (1) | CLOSE AUG 23 1973 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| N | ADDRESSOGRAPH-MULT | 12- 34 | 12 | -1 | -7.6 |
| O | ADVANCED MEMORY SYS | 5- 23 | 6 | 0 | 0.0 |
| N | AMPEX CORP | 4- 7 | 5 | + 1/8 | +2.5 |
| O | ANDERSON JACOBSON | 3- 4 | 3 1/2 | 0 | 0.0 |
| O | BEEHIVE MEDICAL ELEC | 6- 10 | 5 1/4 | - 1/2 | -8.4 |
| A | BOLT, BERANEK & NEW | 6- 12 | 5 3/4 | - 1/4 | -4.1 |
| N | BUNKER-RAMO | 8- 18 | 8 3/8 | - 1/4 | -2.5 |
| A | CALCOMP | 5- 13 | 8 1/2 | 0 | 0.0 |
| O | CAMBRIDGE MEMORIES | 8- 15 | 14 | + 3/8 | +2.7 |
| O | CENTRONICS DATA COMP | 13- 32 | 26 1/2 | - 1/2 | -1.8 |
| O | CODEX CORP | 9- 19 | 11 | 0 | 0.0 |
| O | COGNITRONICS | 1- 3 | 1 3/4 | - 1/4 | -12.5 |
| O | COMPUTER COMMUN. | 1- 4 | 1/2 | - 1/8 | -20.0 |
| A | COMPUTER EQUIPMENT | 2- 3 | 1 7/8 | 0 | 0.0 |
| O | COMPUTER MACHINERY | 5- 13 | 6 | - 1/8 | -2.0 |
| O | COMPUTER TRANSCEIVER | 1- 6 | 1 7/8 | 0 | 0.0 |
| N | CONRAC CORP | 15- 32 | 15 3/4 | -1 1/4 | -7.3 |
| O | DATA ACCESS SYSTEMS | 1- 3 | 2 | +1 | +100.0 |
| O | DATA 100 | 9- 18 | 11 3/4 | - 1/8 | -1.0 |
| A | DATA PRODUCTS CORP | 2- 4 | 3 5/8 | - 1/4 | -6.4 |
| O | DATA RECOGNITION | 2- 3 | 1 1/2 | 0 | 0.0 |
| O | DATA TECHNOLOGY | 2- 5 | 2 5/8 | 0 | 0.0 |
| O | DECISION DATA COMPUT | 8- 40 | 13 1/2 | - 5/8 | -4.4 |
| O | DELTA DATA SYSTEMS | 1- 1 | 3/8 | + 1/4 | +200.0 |
| O | DI/AN CONTROLS | 1- 4 | 1 5/8 | 0 | 0.0 |
| N | ELECTRONIC M & M | 3- 6 | 3 5/8 | - 1/8 | -3.3 |
| O | FABRI-TEK | 2- 5 | 2 5/8 | - 1/4 | -8.6 |
| O | GENERAL COMPUTER SYS | 5- 8 | 4 3/4 | 0 | 0.0 |
| N | GENERAL ELECTRIC | 56- 76 | 59 7/8 | - 3/8 | -0.6 |
| N | HAZELTINE CORP | 5- 8 | 5 1/8 | - 1/8 | -2.3 |
| O | INFOREX INC | 5- 23 | 6 3/4 | - 3/4 | -10.0 |
| O | INFORMATION DISPLAYS | 1- 2 | 1/4 | - 1/4 | -50.0 |
| O | INFORMATION INTL.INC | 10- 15 | 10 1/4 | - 1/2 | -4.6 |
| A | LUNDY ELECTRONICS | 3- 9 | 4 3/8 | 0 | 0.0 |
| O | MANAGEMENT ASSIST | 1- 1 | 1/4 | 0 | 0.0 |
| A | MILGO ELECTRONICS | 14- 26 | 17 | - 1/8 | -0.7 |
| N | MOHAWK DATA SCI | 4- 13 | 4 3/4 | - 3/8 | -7.3 |
| O | ODEC COMPUTER SYST. | 2- 6 | 2 | 0 | 0.0 |
| O | OPTICAL SCANNING | 2- 7 | 5 | + 3/4 | +17.6 |
| O | PERTEC CORP | 5- 8 | 5 | - 1/4 | -4.7 |
| O | PHOTON | 3- 7 | 3 3/4 | 0 | 0.0 |
| A | POTTER INSTRUMENT | 3- 8 | 3 7/8 | - 1/8 | -3.1 |
| O | PRECISION INST. | 2- 8 | 4 | -1 | -20.0 |
| O | QUANTOR CORP | 5- 10 | 6 1/4 | + 3/4 | +13.6 |
| O | RECOGNITION EQUIP | 4- 8 | 5 | 0 | 0.0 |
| N | SANDERS ASSOCIATES | 7- 18 | 8 | + 1/8 | +1.4 |
| O | SCAN DATA | 1- 6 | 1 7/8 | - 1/8 | -6.2 |
| O | STORAGE TECHNOLOGY | 11- 34 | 12 1/2 | + 1/2 | +4.1 |
| O | SYCOR INC | 8- 14 | 13 1/4 | - 1/2 | -3.6 |
| O | TALLY CORP. | 2- 14 | 3 1/2 | - 3/8 | -8.6 |
| O | TEC INC | 6- 8 | 6 | -1 | -14.2 |
| N | TEKTRONIX INC | 30- 53 | 39 | -1 | -2.5 |
| N | TELEX | 3- 6 | 3 1/8 | - 1/8 | -3.8 |
| O | WANGCO INC | 7- 13 | 8 1/2 | - 1/4 | -2.8 |
| O | WILTEK INC | 8- 18 | 11 1/4 | + 1/2 | +4.6 |

### SUPPLIES & ACCESSORIES

| EXCH | | PRICE 1973 RANGE (1) | CLOSE AUG 23 1973 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| O | BALTIMORE BUS FORMS | 5- 8 | 5 | + 1/4 | +5.2 |
| A | BARRY WRIGHT | 6- 13 | 6 3/4 | - 3/8 | -5.2 |
| A | DATA DOCUMENTS | 17- 22 | 20 | - 1/4 | -1.2 |
| O | DUPLEX PRODUCTS INC | 7- 10 | 6 3/4 | + 5/8 | +7.8 |
| N | ENNIS BUS. FORMS | 5- 8 | 5 1/2 | - 1/8 | -2.2 |
| O | GRAHAM MAGNETICS | 9- 20 | 10 3/4 | +1 1/4 | +13.1 |
| O | GRAPHIC CONTROLS | 8- 12 | 10 | - 1/2 | -4.7 |
| N | 3M COMPANY | 76- 89 | 84 1/4 | + 3/4 | +0.6 |
| O | MOORE CORP LTD | 53- 60 | 54 | -1 | -1.6 |
| N | NASHUA CORP | 42- 58 | 48 1/2 | -1 1/4 | -2.5 |
| O | REYNOLDS & REYNOLDS | 40- 51 | 43 1/8 | + 7/8 | +2.0 |
| O | STANDARD REGISTER | 14- 20 | 14 3/4 | - 1/4 | -1.6 |
| O | TAB PRODUCTS CO | 8- 23 | 9 | +1 | +12.5 |
| N | UARCO | 15- 23 | 18 | 0 | 0.0 |
| A | WABASH MAGNETICS | 5- 7 | 6 1/4 | - 1/8 | -1.9 |
| N | WALLACE BUS FORMS | 15- 26 | 18 | - 1/4 | -1.3 |

# This year, minicomputer users plan to buy more Hazeltine CRT terminals than any other... more than twice the nearest competitor!*

*1973 Minicomputer
Market Survey
by Modern Data
magazine.

Why not try a Hazeltine terminal on your mini?
Call us for an on-site demonstration.

**Hazeltine** Corporation Computer Peripheral Equipment Greenlawn, N Y 11740 (516) 549-8800 Telex 96-1435

*EAST* NEW YORK (212) 586-1970 ☐ BOSTON (617) 261 5867 ☐ EDISON, N J (201) 828-5678 ☐ PHILADELPHIA (215) 676-4348 ☐ PITTSBURGH (412) 343-4449
WASHINGTON, D C (703) 979-5500 ☐ ROCHESTER (716) 852-6570
*MIDWEST* MINNEAPOLIS (612) 854-6555 ☐ CHICAGO (312) 986-1414 ☐ CLEVELAND (216) 752-1030 ☐ DETROIT (313) 355 3510
*SOUTH* DALLAS (214) 233-7776 ☐ ATLANTA (404) 252-2045 ☐ GREENSBORO, N C (919) 855 0307 ☐ HOUSTON (713) 783-1760 ☐ ORLANDO (305) 423-1201
*WEST* SAN FRANCISCO (415) 398-0686 ☐ DENVER (303) 770-6330 ☐ LOS ANGELES (213) 553-1811 ☐ SEATTLE (206) 242-0505
*IN CANADA* CAE ELECTRONICS, LTD (514) 341-6780
*FOR WORLDWIDE SALES INFORMATION CALL. (516) 549-8800*

HAZELTINE AND THE PURSUIT OF EXCELLENCE